GOLDEN JUBILEE

1915–1965

UNION MISSION TUBERCULOSIS SANATORIUM

AROGYAVARAM (ANDHRA)

SOUVENIR

GROUP PHOTOGRAPH FROM FIRST ANNUAL REPORT

Lord Pentland, Governor of Madras, who opened the UMT Sanatorium on 19-7-1915
along with Dr. Christian Frimodt-Möller, First Medical Superintendent
and members of the Governing Body

Panoramic view from a hill crest in the early 'thirties

UNION MISSION TUBERCULOSIS SANATORIUM

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AROGYAVARAM, ANDHRA PRADESH

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Her Excellency with Dr. P. V. Benjamin, Bishop V. S. Azariah and Senior members of staff

Dr. S. RADHAKRISHNAN
President, Indian Republic

Messages

RASHTRAPATI BHAVAN,
NEW DELHI-4.
राष्ट्रपति भवन,
नई दिल्ली-4

May 31, 1965
Jyaistha 10,1887

I am glad to know that the Golden Jubilee of the Union Mission Tuberculosis Sanatorium will be celebrated shortly. I send my congratulations to all those associated with this institution and my best wishes for continued success in its humanitarian activities.

(S. Radhakrishnan)

I am happy to note that the Golden Jubilee of the Union Mission Tuberculosis Sanatorium, Arogyavaram, will be celebrated on the 19th of July, 1965. It is a matter of great satisfaction for the public and the profession to recount the great services rendered by the Sanatorium and the pioneering work that has been done by this institution in the field of tuberculosis service, medical education and research. The credit goes to Dr. Frimodt-Möller and his great father, who was sometimes Commissioner, Tuberculosis, Government of India.

The Children's Hospital which was started with the assistance of the Government of India is a great asset for rendering valuable paediatric service.

In the field of Thoracic Surgery, this institute has made a great name.

I have great pleasure in wishing the function all success and a great future for the Sanatorium.

K. N. Rao,
Director-General of Health Services
Government of India

New Delhi,
June 11, 1965

I am extremely happy to learn that Union Mission Tuberculosis Sanatorium, Arogyavaram, is celebrating its Golden Jubilee this year.

I personally know about the working of this Institution for the last 25 years and I proudly say that it is one of the first and best managed Tuberculosis Hospitals of our country. The courteous and efficient treatment and prompt attention extended to the patients in this Hospital are highly commendable and all the credit should necessarily go to the Head of the Institution and his colleagues.

I wish the Golden Jubilee celebrations all success.

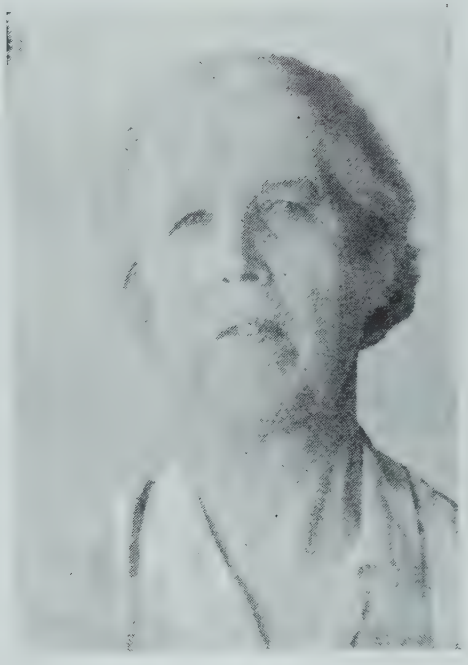
M. N. LAKSHMINARASIAH
Minister for Panchayati Raj
Andhra Pradesh

Hyderabad,
June 10, 1965

Dr. Christian Frimodt-Möller, First Medical Superintendent and First Medical Commissioner of the newly formed Tuberculosis Association of India and Mrs. R. Frimodt-Möller

Gertrude Dodd Memorial Library and Frimodt-Möller Recreation Hall (*Front-view*)

Rev. R. M. Barton
Former Clinical Pathologist, Secretary
and Treasurer,



Mrs. R. M. Barton

FIFTY YEARS OF SERVICE

Rev. R. M. BARTON

It was in the early years of the present century that the problem of tuberculosis began to be faced by the medical profession in India and through them by the general public. This followed closely on the attention which had been given to the disease in the West subsequent to the discovery of the tubercle bacillus in 1881 by Robert Koch. Even in the West, however, the early high hopes of finding a speedy cure for tuberculosis had waned as method after method was tried with little success. Finally not much was left except the ideal rest, good food, and a regulated life, and this could best be obtained in special institutions called ' Sanatoria ', and these mostly for cases which we should now call early cases.

In India the situation appeared to be rather hopeless, and we find a leading I.M.S. doctor writing, ' Once the lungs show signs of being attacked in Indians, the prognosis is the very worst possible, the percentage of recovery is so small as to be negligible.' This being the attitude to patients suffering from tuberculosis it is no wonder that any organized attempts to treat them were slow in being taken up ; they would only occupy valuable beds in institutions needed for patients with diseases more amenable to treatment, in the end they would die in any case, so why waste beds and money and moreover why risk infection of other patients and hospital staff. The same doctor speaking of Sanatoria wrote, ' It would be a great mistake in my opinion to create these institutions in India as yet . . . they will get a bad name as any and every case is likely to be sent to them without any selection.' He advised the building of special hospitals in the suburbs of towns mainly for isolation and prevention of infection of others, with the providing of some measure of relief for the sufferers themselves.

Beginnings of the Sanatorium Movement in India

This was the atmosphere in which a beginning was made with Sanatorium treatment in India. Christian Missions felt the call in the name of Christian compassion to take up the burden of trying to help sufferers from tuberculosis whose state seemed so helpless and so hopeless. The first open-air institution to be opened was in 1906 in Tilaunia near Ajmer intended primarily for girls from schools and orphanages connected with a Christian Mission. This was followed by one in Almora in the Himalayas in 1908 and another for women and girls in Pendra Road in the Central Provinces (now Madhya Pradesh) ; all

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Lt.-Col. J. R. Roberts, Administrative Medical Officer in Central India, Aug. 1911 in a letter published in *Medical Mission in India*, Jan. 1912.

these were established by Christian Missions. A number of Bombay philanthropists, mainly Parsees, opened a Sanatorium in Dharampore in the Simla Hills in 1909. The first Sanatorium under Government auspices was begun in 1912 in Bhowali. In 1912 a Sanatorium was begun by Dr. Billimoria in Poona and two years later was moved to Panchgani.

About the same time a similar movement began in South India which resulted in the establishment of the Union Mission Sanatorium in Madanapalle. Those responsible for educational institutions were troubled by 'the considerable and apparently increasing incidence of tuberculosis in the rising generation especially of the school and college class.' They felt that 'the question of the isolation and efficient treatment of the numerous cases of tuberculosis amongst the younger generation of the Christian community (especially Mission Schools and Orphanages) is one which calls for earnest consideration on the part of responsible authorities in the field.'

Beginning of the Union Mission Tuberculosis Sanatorium

The first proposal for a sanatorium in South India was brought forward by Dr. T. V. Campbell of the London Mission, Jammalamadugu, Cuddapah Dt., who had returned to India after he had to go to England for the treatment of pulmonary tuberculosis. He called together a group of medical missionaries in Kodaikanal in 1908. The following year the matter was laid before the South Indian Missionary Association at a meeting in Madras, and a representative committee was formed to draw up plans for a sanatorium to be run by a group of missions working together. During the following year a scheme was placed before the missions working in South India and the Madras Government was approached for support. On October 24th, 1912 the representatives of seven missions met and organized themselves as the Governing Body of the Union Mission Tuberculosis Sanatorium ; these seven were :

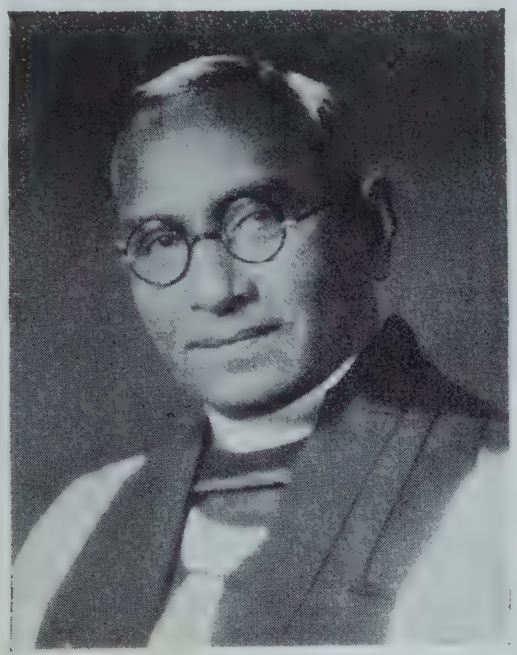
London Mission
American Arcot Mission
American Evangelical Lutheran Mission
United Free Church of Scotland Mission
Danish Evangelical Lutheran Mission
Basel Mission
Church of England Zenana Mission.

This was a remarkable combination for those days consisting as it did of representatives of five different nationalities and of seven different Christian denominational groups.

In the next few years this number was enlarged to include also :—

American Baptist Mission
Australian Presbyterian Mission
Church of Sweden Mission
Methodist Episcopal Mission (American)

FORMER PRESIDENTS OF THE GOVERNING BODY OF U.M.T. SANATORIUM



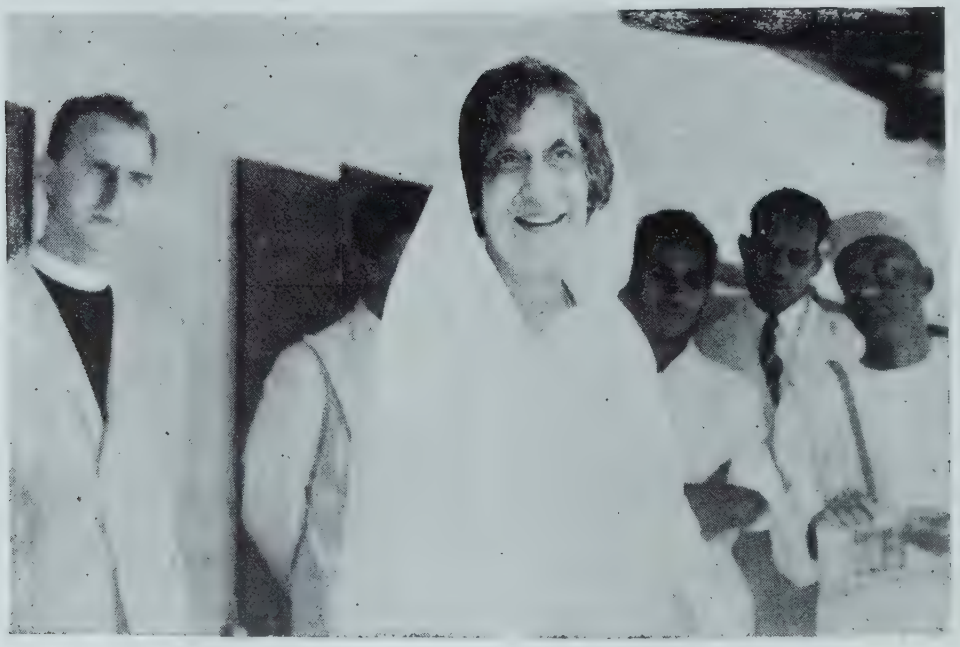
The Late Rt. Rev. V. S. Azariah
Bishop in Dornakal

Rev. B. Rottschaefer
American Arcot Mission

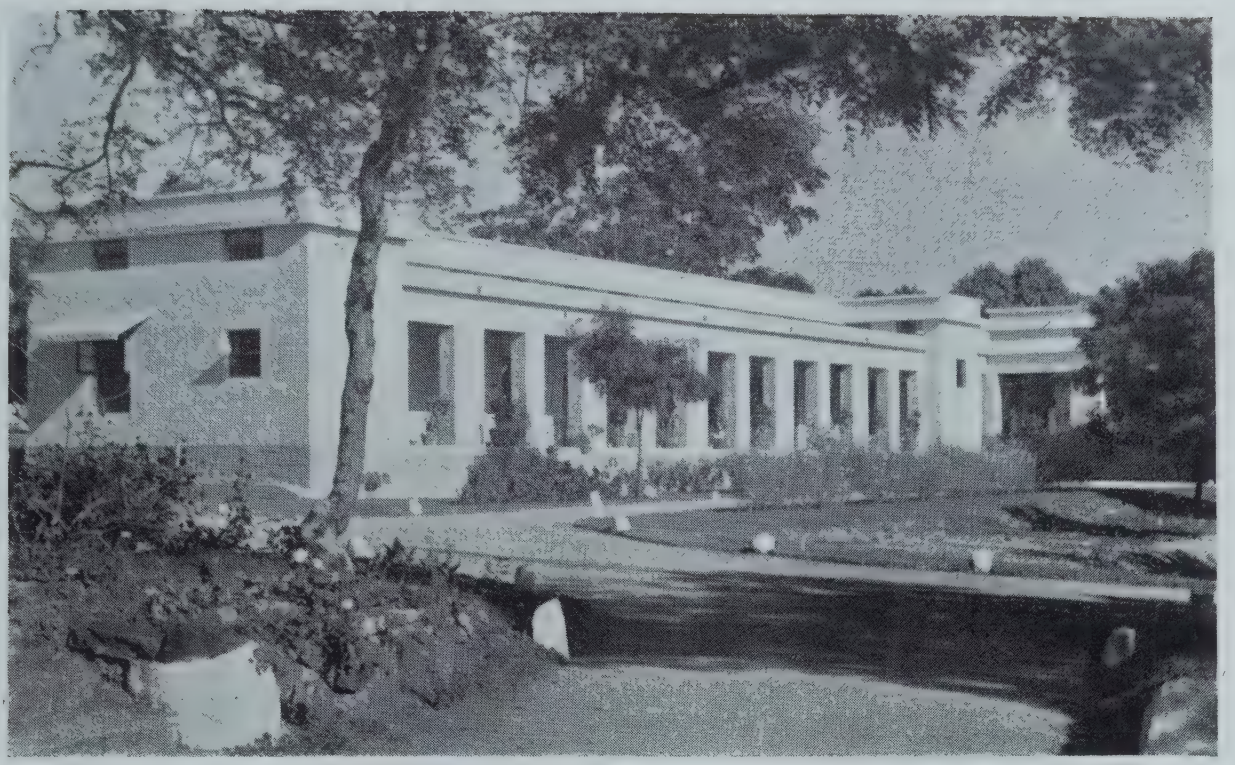
Dr. C. G. Cutting
London Missionary Society

The Rt. Rev. H. Sumitra
Former Bishop in Rayalaseema

The Bengal Semi-General Ward—Donated by the Tuberculosis Relief Association of Bengal



The Hon'ble Rajkumari Amrit Kaur at the opening of the Bengal Semi-General Ward, 1948



First Extension to the Operation Block, 1941

Addition of second wing to Operation Block, 1955

Daily Market—Building erected from Sanatorium Local Authority Funds

Flower Garden with General Ward in the background

Society for the Propagation of the Gospel
Wesleyan Mission
Church Missionary Society (Telugu Section)
Ohio Lutheran Mission

The Basel Mission and the Ohio Lutheran Mission continued to be members for only a short time, and the Church of Sweden Mission (Tamil Evangelical Church) withdrew in 1958. In 1957 the Church of England Zenana Mission merged with the Church Missionary Society. In 1925 the Lee Memorial Mission of Calcutta joined the Association ; in 1943 the Mar Thoma Syrian Church of Malabar ; and finally in 1959 the Convention of Baptist Churches of the Northern Circars. The names of some of the supporting bodies have changed as control of the work was vested in the Indian Church rather than in overseas missions. The Sanatorium has been in the happy position of having most of the original members continuing their membership and their support of the Sanatorium and interest in it during the whole of the fifty years of its existence. This stability of membership has meant much in the ability of the Sanatorium to take such a large part in the fight against tuberculosis in India.

The Search for a Site

With the whole of South India to choose from, where should the Sanatorium be located ? In accordance with the prevailing ideas about a sanatorium certain requirements were postulated : it should not be very close to a town from which daily interruptions and worries could come to patients through frequent visits of relatives ; it should be accessible by railway—it should be remembered that in those days bus transport was not in existence and private cars were few ; it should be in a place comparatively free from dust ; it should not be exposed to heavy rain-bearing winds or in a place with a heavy monsoon ; it should if possible be at a moderate elevation above sea-level to give cool nights to ensure good rest and sleep for patients ; finally, it should be in Madras State in order to be eligible for a hoped for Government grant-in-aid. The high hills were not favoured, partly because of the difficulty of transport at that time, and partly because it was thought patients would suffer a setback on return to the plains after treatment in the hills.

An offer was made by the Arcot Mission that the Committee should take over a small sanatorium in Madanapalle in Chittoor District which had been maintained intermittently for two years to accommodate tuberculous patients, chiefly women and girls ; this would allow the Committee to begin work while they searched for a permanent site. This institution in Madanapalle had itself taken over a small sanatorium started in 1909 in Punganur, 15 miles from Madanapalle, with a gift of $1000 from Miss Gertrude Dodd who was so closely associated with Medical College, Vellore, from its early years. In Madanapalle it was possible to give better medical supervision than in Punganur.

The Sanatorium in Madanapalle was on a piece of land adjoining the Mission Hospital for Women and Children run by the Arcot Mission. All the land that could be available was, however, only 16 acres, and this was far too small for the institution the Committee had in mind, so a search for another site began. In the meantime Dr. Louisa H. Hart of the Arcot Mission cared for the patients in the Sanatorium in addition to her other work in the hospital, and she was assisted by Miss M. E. Macdonnell of the London Mission. The start of the Sanatorium owes much to these two devoted ladies.

In his address on the occasion of the Silver Jubilee of the Sanatorium the Rev. B. Rottschaefer who had been associated with the Sanatorium from its beginning began with a quotation from the New Testament, (Matthew 9:29) : ' According to your faith be it unto you ', and the years that followed proved the truth of that statement of Jesus. The search for a site began, and the finding of the present site is best described in the words of Dr. L. R. Scudder, President of the Sanatorium Committee for many years from the beginning, spoken at the opening of the Sanatorium :

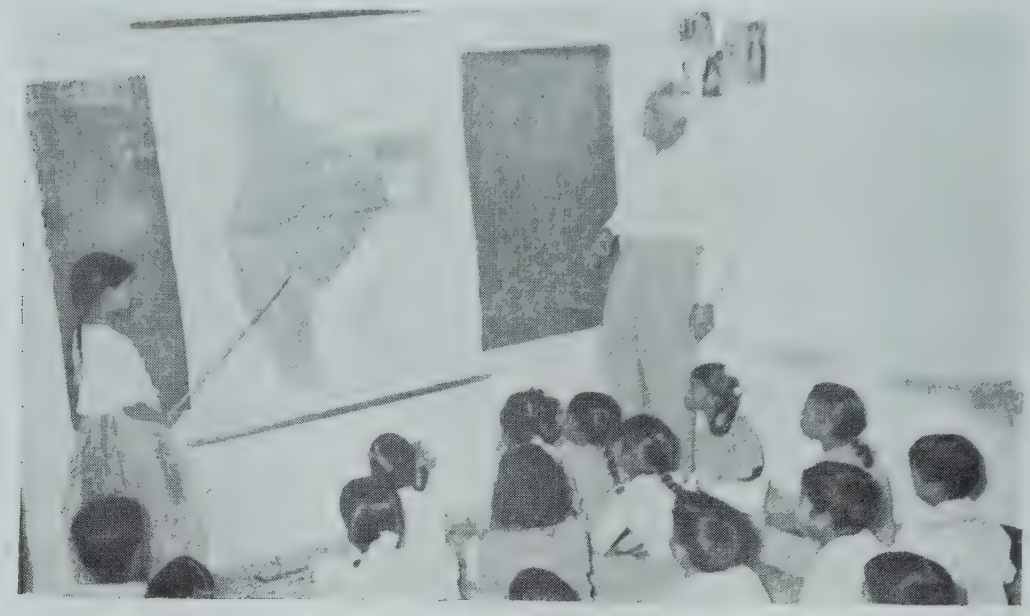
' Perhaps in nothing has God's providential leading been so apparent as in enabling us to secure this beautiful site and erect these buildings. We needed a site. At the close of a day of apparently fruitless search, the Executive Committee were led, we believe by God's providence, to this very spot. After we had walked over it, it did not take us long to decide that it was an ideal site. A part of it was privately owned and purchasable. But the larger part was Government Forest Reserve. And we know how difficult it would be, humanly speaking, to secure it. But we were so convinced that it was the site for us that we stood in a group at the foot of this hill and bowed our heads in prayer to God that He would give it to us. We authorized Mr. Rottschaefer to purchase the privately owned land which he was enabled to do within a few days. And we sent in our request for the Forest land to the District Officials. Unknown to us the Forest Department had come to the conclusion that this particular reservation was a failure. And when our application came to them the District Officials strongly recommended that it be given to us. This the Madras Government endorsed and sent on to the Imperial Government. After the usual delays seventy-four acres of this reservation was given to us free of assessment.'

And so the site was found. But it required much faith to imagine a sanatorium on the land as it was then. It was rather uneven rocky land covered with scrub jungle, thorn bushes and prickly pear. It was four miles from a minor railway station, four miles from the small town of Madanapalle, the road either way not very good and considered unsafe at night because of bandits. In later years when advice was asked of the Forest Department about growing trees the reply was : ' It is we who ought to come to you for advice because you people have made trees to grow where we failed.'

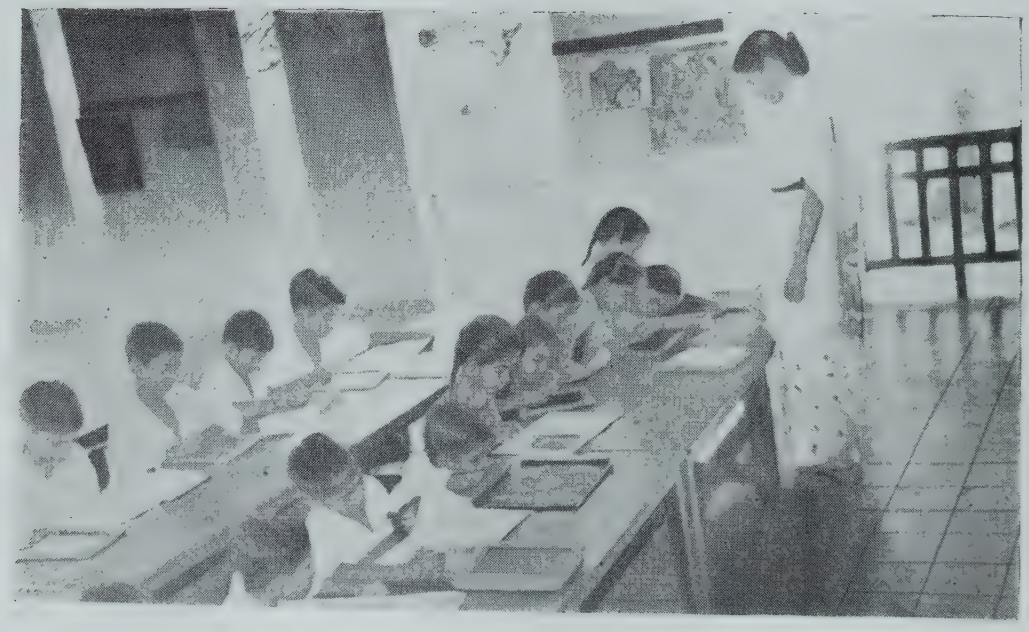
Dr. P. V. Benjamin
Former Medical Superintendent and
Adviser in Tuberculosis
Government of India

Mrs. P. V. Benjamin

Dr. P. V. Benjamin, Medical Superintendent and Staff, 1945



School for Staff Children
(Elementary, Middle and English Medium Sections)



Unaided, Recognized School for patients in Children's Hospital

The Finding of Funds to Begin

While the choosing of a site was going on efforts were being made to raise funds both for building and also for maintenance. The missions did not respond as well as had been hoped. Most missions were then, as always, hard-pressed to find money to carry on ' their own work ', the idea of unitedly working together was a new conception which all were not ready to receive, and perhaps all were not convinced that tuberculosis was indeed a major problem. From the missions Rs. 15,000 was raised for buildings and equipment, and for upkeep a little over Rs. 3000 a year was promised by way of annual subscriptions. The Government of Madras responded generously with an offer of half building grant up to Rs. 30,000, and a half annual upkeep grant of up to Rs. 10,000. Under these circumstances it needed much faith to begin, but the members of the Committee were men and women with vision and determination. One of them Dr. A. M. Macphail of the Church of Scotland Mission, Madras, raised Rs. 11,000 from among her friends ; there was enough to begin building, and indeed enough to be able to claim the full Government grant. Donors to the funds to start the Sanatorium included the Rajah of Pithapuram, Sri K. Srinivasa Iyengar, Sri C. P. Ramaswami Iyer, W. B. Beardsell Esq. ; Khan Bahadur Waljee Laljee provided a safe which is still in use, Messrs. Oakes & Co., Madras, furniture for a ward. There were of course many other gifts in money or in goods.

The Finding of a Builder

Next was needed an architect and builder, and he was found in Rev. B. Rottschaefer, a young missionary stationed at that time in Madanapalle. With the help of a Building Committee and advice of the Public Works Department, he drew up plans and estimates for these buildings to cost something over Rs. 60,000. With slight modifications these were accepted by the Government of Madras and in one year Mr. Rottschaefer was able to get all the buildings ready for the opening in 1915. As said in the first report of the Sanatorium it was an achievement that any technically trained builder might be proud of and elicited the admiration of all who saw the work. The Government acknowledged his ability later by giving him the authority to sign plans submitted for Government grant, an authority usually given only to qualified building engineers.

The Finding of a Staff

It became obvious that work as she would it was impossible for Dr. Hart to continue both her work in the Women and Children's Hospital, and at the same time look after the Sanatorium. A young Danish doctor, Dr. C. Frimodt-Möller, M.B., B.Ch. (Copenhagen) who had been in charge of a mission hospital in Tirukoilur, S. Arcot District, and had actually brought that hospital into being, was permitted by his mission to take up the post of Medical Superintendent of the new Sanatorium, and December 1st 1914 was a red-letter day when

he joined the staff. He was peculiarly fitted for this work by training, although he did not have at that time extensive experience in treating tuberculosis, by experience in India, and temperament. Miss Macdonnell continued to be Nursing Superintendent until early in 1917, when much to the regret of the Governing Body, she felt the time had come for her to leave. Some months earlier she had been joined by Miss A. Tate of the Rajahmundry Lutheran Mission, and on Miss MacDonnell's departure she became Nursing Superintendent. During 1917 and part of 1918 Dr. Frimodt-Möller was on furlough and during his furlough made a special study of tuberculosis under a world famous specialist in tuberculosis in Denmark, Professor Saugman. During the interregnum several doctors were lent by the co-operating bodies to keep the Sanatorium going; these included Dr. I. S. Scudder of the Arcot Mission, Dr. A. S. Kugler of the Guntur Lutheran Mission, Dr. Winterbotham of the London Mission, and again Dr. L. H. Hart. It was not easy to get an Indian medical staff, but Dr M. David, L.M.P. worked until 1917 and was followed by Dr. S. David, L.M.P. who is still alive and active in Mysore, having left the Sanatorium in 1921. Trained nurses were few and these mostly looked after the women patients. The men were cared for by 'compounders' who were given some nursing training.

July 19th, 1915

This was the day chosen for the opening of the Sanatorium in its present site, and the new buildings were declared open by the then Governor of Madras, Lord Pentland, P.C., G.C.I.E., the ceremony taking place in what is now known as III Ward which was converted for the occasion into a reception pavilion. After prayers Dr. L. R. Scudder narrated the steps which had led to the building of the new Sanatorium. Dr. C. Frimodt-Möller spoke of the aim and significance of the institution, and with a remarkable foresight outlined developments in the treatment of the disease and in the work of the Sanatorium, the necessity for home treatment as well as institutional treatment—now an accepted policy in tuberculosis work in India—, of the place the Sanatorium could have in research in the treatment by medicine, surgery, in X-rays and in laboratory work. His Excellency the Governor spoke of the courage and the devotion of all concerned with the successful launching of the institution and concluded: 'It only remains for me to express the pleasure I personally have had in being present on this occasion and in declaring open the new buildings of this institution, to wish it on behalf of the Government and of you all a long career of ever increasing usefulness in the relief of suffering and in the conflict with disease. That conflict will, no doubt, be long and arduous. The enemy's lines, may we not say, are before us still unbroken, but the trenches have been opened against them, and I believe we may go forward under Providence with a good hope of success.'

Consolidation

The years that followed immediately after the opening were years of consolidation, the strengthening of the work built on the first foundations. Progress was made difficult by the First World War, but progress was made. The Sanatorium began with five general wards, still in use with only slight modifications, and with fifteen private wards for more well-to-do patients, giving a total accommodation for 109 patients. The wards were a little spartan and very much ' open-air ', built in this way partly because money was not available for a more luxurious type of ward and partly because this fitted in with current ideas of open-air treatment. Fortunately the climate was such that no severe cold weather in winter or excessive hot weather in summer necessitated more protection than could be given by simple bamboo ' tatties ' which could be rolled up when not required. An administration block provided room for an office, a small laboratory, a dispensary and a linen room. A lecture hall near by was used for worship on weekdays and Sundays, and also for a library and for entertainments. As the Sanatorium was four miles away from the town staff quarters for doctors, nurses and other staff had also been built.

It was realized that further enlargement of the Sanatorium would be called for shortly, specially for more private wards, but not surprisingly it was stated in the first report that ' the whole financial position of the Sanatorium is somewhat strained at present on account of all the prices of building materials going up far above what was budgetted before the war broke out. This has put the Sanatorium in considerable difficulties. We are at present left without sufficient funds to complete the original scheme, especially the water supply, the needed kitchens, and the shelters for the large stock of cows which it is necessary for the Sanatorium to keep.'

Gradually the compound began to look more ' civilized '. Rocks and stones were cleared away and roads and paths were laid out. The jungle trees, which uncared for grew as small shrubs, with care began to grow up and rapidly growing trees such as gul mohur were planted to provide protection from the wind and to add beauty to the scene. Neem trees (margosa) were found to thrive even if their growth is a little slow, with the result that a popular belief grew up that they were good for tuberculosis ! Widespread prickly pear began to be controlled but this control was complete only when the cochineal insect was introduced several years later.

Water was a problem. A well had been constructed in what is now known as the Women's Park and water from this had to be carted up the hill for about two furlongs. Caste patients were allowed to draw water from a large open well behind a hamlet on the further side of the main road. To save carrying water a high water tower was built near the lower well, a landmark for miles around, and water was pumped up to the reservoir on top by hand pump. This helped for a time, but the water supply in the well was inadequate for a growing population of patients, attendants and staff, specially as it was found later the

well was not directly on a spring. In 1921 a large open well had been dug about six furlongs from the Sanatorium on the eastern side. To do this, for the first and only time, the Sanatorium went into debt even if the debt was a loan from a few of the co-operating bodies. In about three years the debt was cleared, but a little later the principle of not going into debt was adopted by the Governing Body based on a saying of Mrs. Ada Lee of the Lee Memorial Mission, Calcutta, which joined the Sanatorium in 1925 :—' If God wants you to have something He will give you the money beforehand and not afterwards.'

The cows mentioned in the first report were maintained for only a short time, but fifty years later the area where the cows were kept is still popularly known as ' The Cowshed ', even if officially it has been renamed ' Lillipuram ' following a gift from Miss Lily Stanes for constructing servants' houses there. The cow project failed probably because there was no one with knowledge to care for the cows and pasturage was poor. Instead, village people from the surrounding hamlets were encouraged to bring in milk and this still continues ; it has been of great economic help to the nearby villages. From time to time the supply is unable to meet the demand, and sometimes it has been possible to supplement the village supply with powdered milk. Several times schemes have been revived for a dairy farm but so far nothing has materialized as it was worked out that the milk so supplied would cost far more than was being paid for it from the villages.

Arogyavaram

In July 1918 a branch post office was opened in the Sanatorium, but still a great part of the mail went to Madanapalle, and only on the following day was sent out to ' The Fourth Mile ' as it was then often called. Patients frequently arrived before letters or telegrams were received and were often very tired before a way of getting them from the station was arranged for. Therefore it became necessary for the Sanatorium to have its own postal name. Out of several suggestions a small committee chose ' Arogyavaram ', a name in line with other place names in South India, and composed of the roots of two Sanskrit words, ' arogya ' meaning ' health ' and ' varam ' meaning ' a gift of God ', a name which could be understood all over India, a wonderful choice. It then became possible not only to address letters directly to the Sanatorium, but also a few years later when a telegraph office was also opened to telegraph from anywhere in the world with a one word address, Arogyavaram.

Surgery Begins

In the West surgical methods in the treatment of pulmonary tuberculosis were gradually spreading, and these methods became possible in the Sanatorium with the arrival of Dr. J. Gravesen, a surgeon of experience from Denmark. In 1922 he took charge of the Sanatorium during an absence of Dr. Frimodt-Möller on furlough. It was not long before Dr. Gravesen began to do some

The Late Prime Minister Pandit Jawaharlal Nehru addressing staff and patients at U.M.T. Sanatorium, September 1952
(Nehru's remarks for Visitors' Book)

I am happy to visit this famous Sanatorium about which I had heard so much. I wish it all success in carrying out its work of healing.

Jawaharlal Nehru
Oct 7. 1952

The New Look

The approach to the Administrative Block

surgery in Arogyavaram, beginning with artificial pneumothorax which by this time was being widely used in the West to produce collapse and rest of the diseased lung. But his work was hampered by the absence of X-rays and electricity. Even thoracoscopy with cauterizing of adhesions was attempted and one operation for thoracoplasty was performed, but further attempts in this direction had to be postponed for a few years until X-rays had been installed.

In 1922 the staff was increased by the arrival of *Dr. P. V. Benjamin*, a young graduate of Madras Medical College whose association with the Sanatorium in various capacities has continued until now. *Miss M. K. Blair* of the Andhra Evangelical Lutheran Mission, Guntur, was loaned by her mission and was Nursing Superintendent for several years.

Improvements

As earlier foreshadowed there was soon a great demand for patients applying for private wards, and to meet this demand a series of temporary wards of simple structure with thatched roofs was constructed. Although they were styled ' temporary ' they were in continual use for over thirty years and only very recently was the last one replaced with a ward with a tiled roof. In 1918 an infirmary building was donated by Captain Kirwan and Mr. E. W. Stoney, with an operating theatre and three consulting rooms. Other improvements at this period included wards for women purdah patients, staff quarters and certain amenities in the older wards. By 1922 the bed accommodation had increased to 140. A laundry was built, but the hope that ultimately it could care for all the washing of clothes of both staff and patients as well as of the hospital linen has never been fulfilled, and so local dhobies still continued to wear out the rocks by traditional methods.

Laboratory Work Begins

From the beginning of the Sanatorium a little laboratory work had been done by a ' compounder ' who had had a little instruction, mostly the examination of sputum. In 1923 the Rev. R. M. Barton came as a patient and it was found that for most of the war he had been doing laboratory work in the Royal Army Medical Corps ; so it was not long before he was doing the laboratory work of the Sanatorium, at first while still a patient, and except for one year in other work he was in charge of the Sanatorium laboratory until he retired in 1962. In 1925 the laboratory took over the operating theatre which was not then in use, but in 1926-27 a new laboratory was built, beginning with three rooms and later being extended in several stages until it has reached its present size with space both for the work connected with the clinical side of the Sanatorium and also with the research side.

X-rays

A great step forward was made when at the time of the tenth anniversary the corner stone was laid for the X-ray unit by the Rajah of Panagal. Later

in the year the apparatus which had been lying on a verandah for a year was installed. The cost of the apparatus was met by Miss Gertrude Dodd and Dr. Ida S. Scudder of Vellore, and the Government of Madras met half the cost of the building. At last it became possible to diagnose and judge the extent of disease in patients and to control treatment. The use of auscultation and percussion gradually assumed less importance, their place being taken, although never completely, by the visual method of X-ray.

The Second Decade, 1926-1935

The second decade in the life of the Sanatorium was one of steady growth in all directions. The accommodation increased from 140 to 230; two more general wards of 18 beds each were added, two semi-general wards and numerous private or, as they came to be called, special wards, many of them paid for by patients who were anxious to get admission—a ward of simple type could be built in about ten days. The new laboratory was built and later extended, a beginning was made with the operation block with post-operation rooms. In February 1932 an electricity system was installed and all the wards, administration buildings and staff quarters except huts were lit by electricity, and 86 street lights were provided. The improvement of lighting made a great difference to the life of the Sanatorium ; the old kerosene oil lamps became a thing of the past. In 1934 an internal telephone system was introduced, an amenity which made communication between distant parts of the Sanatorium easy, information between different administrative sections became easy and doctors could quickly be called in an emergency. A beginning was made with a septic tank system of sewage disposal. A school was built for the children of the Sanatorium staff—the school had been carried on for several years in a small house intended for a servant. As the staff grew more quarters had to be added for them as no outside accommodation was available.

All these extensions and improvements were made possible by a number of generous donations from various sources including the Government of Madras, Their Majesties' Silver Jubilee Fund, the Tata Trust, the Lee Memorial Mission of Calcutta, and many private donors.

Teaching. The training of *doctors* was a feature of the work right from the beginning of the Sanatorium, at first of course of its own staff, but from 1922 doctors began to come from other institutions for longer or shorter periods of training. In the same year students from the Medical School for Women, Vellore, began to come in groups for two weeks' instruction in tuberculosis.

The training of *laboratory technicians* began in 1927 at the request of the Christian Medical Association of India ; at this stage the course of training lasted for six months and some hospitals were surprised that the training was so long ! Later it was lengthened to nine months and still later to one year for the basic training. By 1935 56 had been trained of whom 26 were women; each class was about six in number.

Dr. Karmakar, Minister for Health, Govt. of India, at the handing over ceremony of Colombo Plan Equipment

X-Ray Block installed with Watson X-Ray, Colombo Plan Gift

The late Rajkumari Amrit Kaur, Minister for Health, Govt. of India, at the opening of the Children's Hospital

Approach to Children's Hospital

Advances were made in *treatment* along the lines found useful in the West; some of these were later dropped as they did not come up to first expectations. The treatments included tuberculin (B.E.) injections, Dreyer's vaccine; the vaccine did not appear to have much effect as 4 patients improved remarkably, 16 improved but would have done equally well without it and 11 grew worse but 'the vaccine did not do any harm to these patients'. Sanocrysin began to be used about 1926 and continued to be used until 1946, but in the later years but few patients were treated with it, and when it was stopped it was not missed. Ultra-violet light treatment was begun for the treatment of non-pulmonary tuberculosis in 1928 and was continued for some years.

Surgery was developed, particularly from a year, 1928-29, when Dr. R. H. H. Goheen of Miraj and Vengurla, was acting as Medical Superintendent during a furlough of Dr. Frimodt-Möller; during this period we find numerous phrenic-exairesis operations, and a few for thoracoplasty and thoracoscopy with cauterizing of adhesions. Later, oleothorax and scalenectomy were added to the operative procedures. Artificial pneumothorax was induced in about 40 per cent of the patients. From 1929 Dr. Benjamin was largely responsible for the surgical ward.

Research work and the publication of results were from the early years of the Sanatorium considered a necessary part of its work with a view to helping other workers in tuberculosis. In 1921 Dr. C. Frimodt-Möller wrote a paper for 'Tubercle' on 'Climate and Weight of Tuberculous Patients in South India' and Dr. Gravesen wrote on 'Lung Collapse Therapy in connection with Pleural Adhesions'. In 1925 and 1926 papers were published on Sanocrysin Treatment and another on Sanatorium Treatment in India. In 1927-28 Dr. Frimodt-Möller, Dr. P. V. Benjamin and Dr. D. G. Gnanamuthu all had papers published; in 1929 Dr. Goheen, Dr. Benjamin, Dr. Frimodt-Möller and Mr. Barton; in the following years two or three papers a year were written by members of the staff.

Besides this members of the staff were frequently called upon to give *lectures* at various conferences and meetings; some of these lectures were published but many were not.

Much of this activity was made possible because the *staff* was relatively stable during this decade. Dr. C. Frimodt-Möller and Dr. P. V. Benjamin were the two seniors, but others came to have several years of experience, such as Dr. T. J. Joseph later Medical Superintendent of Kasauli Sanatorium; Dr. D. V. Gnanamuthu later Medical Superintendent of Itki and afterwards of Baroda Sanatorium, Dr. M. C. Verghese later Medical Superintendent of Pendra Road, Nagercoil and Trichur Sanatoria. Dr. Isaac David and Dr. J. Daniel stayed for some years. In 1930 Dr. Benjamin spent a year in study in Europe and U.S.A. and in 1933-34 Dr. Joseph was awarded a scholarship to study for a year in Rome and visited other countries also.

Nursing was also developed; Miss M. K. Blair was succeeded in 1927

by Miss Lily Stanes, and she was joined by Miss Elisa Prior in 1929, and in 1932 by Miss E. Lund.

The need for *After-Care* was early felt; some patients when the time came for their discharge from the wards still needed to be under medical supervision if they were to remain well, and in the early years this was almost impossible to get outside the Sanatorium. The beginning of the Ex-Patients' Colony was made in 1921 with five looms and mulberry cultivation for silkworm rearing. In 1923 the writer of this paper regularly heard the clack, clack, clack of the handlooms. In 1929 about 10 acres of land was purchased on the west side of the main road and expansion of the Colony became possible, with more quarters for ex-patients and with some addition to types of work. About 1934 the Colony shop was begun, later to develop into one of the features of the Sanatorium.

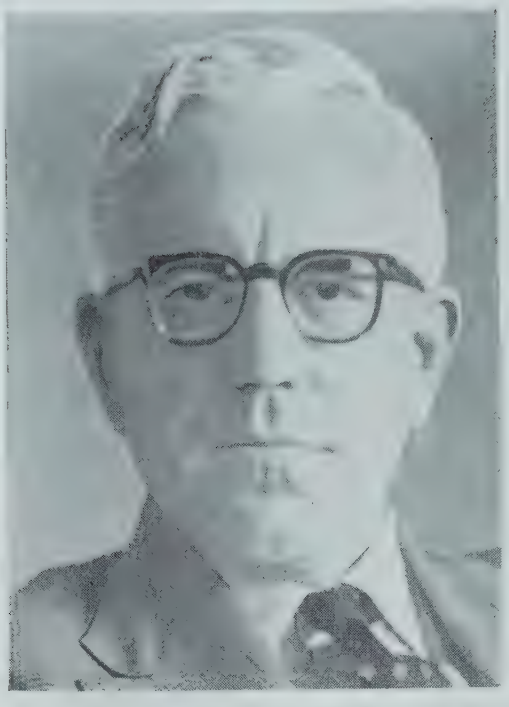
In 1930 an attempt was made to trace all patients who had been treated in the Sanatorium during the decade 1915-1925; it was possible to follow up about two-thirds of the patients discharged, and it was found that over half of these were alive and most doing full work five years after their leaving the Sanatorium even though a large proportion was in an advanced stage of the disease when admitted for treatment. The improvement of treatment in the last half of the period was reflected in the better after-results.

The Third Decade—A Beginning Change of Emphasis

Until 1935 the emphasis in the Sanatorium had been wholly on treatment and improving the treatment. It began to be felt, however, that the treatment of a few patients, even a few hundreds, hardly touched the fringe of the tuberculosis problem in India. Something had to be done about the prevention of the disease. Further, the greater the number of doctors who came for instruction the greater was the need for that instruction not to be one-sided, even if most of the students were drawn to the clinical side rather than the epidemiological side by personal inclination. While it was assumed that tuberculosis was widespread in town and village there had been done very little work to show whether this impression corresponded with fact. It was with this in mind that the Sanatorium began a series of tuberculosis surveys. In 1936-37 a tuberculin survey was undertaken in two small towns and in a number of villages in Chittoor District, covering over 6600 adults and children. It was shown that although the area was comparatively isolated and sparsely populated it could not be called virgin soil as regards tuberculous infection even if few active cases were discovered. In 1939 a more thorough type of survey was begun in Vayalpad, a small town situated 9 miles from the Sanatorium, but the work was later hindered by war conditions such as shortage of petrol. Just before that survey was begun in Saidapet, a suburb of Madras, at the request of the Saidapet Health Project, covering over 3300; this survey included X-ray examination of individuals with a strong tuberculin reaction. Active tuber-

Corner of Children's Hospital Quadrangle

Nursery Section of School in Children's Hospital



Dr. J. Frimodt-Möller
Former Medical Superintendent,
at present Research Director

Mrs. K. Frimodt-Möller

The Rajkumari Amrit Kaur Tuberculosis Hospital in Madanapalle, opened in 1950, serves as an isolation hospital for cases detected in X-ray Survey by the Research Section

culosis was found in 33 of this number and probably another 50 were suffering from tuberculosis needing treatment. This began to show the magnitude of the tuberculosis problem as there was no reason to suppose that Vayalpad was any difference from other South Indian towns.

In 1939 the first class for doctors who wished to sit for the new Diploma for Tuberculous Diseases, of Madras Government was begun. This was the first diploma course in tuberculosis instituted in India. Three months of the course were spent in Madras and six months in the Sanatorium. This became a very popular course. In 1946 for medical graduates the course became a Madras University course.

The Silver Jubilee of the Sanatorium was celebrated on July 19th 1940. One of the functions was the opening of the Recreation Hall and Patients' Library, the greater part of the cost of which came from ex-patients of the Sanatorium. This hall was later equipped with a cinema and has been a centre of much life in the Sanatorium for entertainments, meetings and other functions, Shortly before that a hostel had been built for doctors coming for study—the Lady Linlithgow Hostel—the cost of which was met by Diwan Bahadur M. Balasundaram Naidu, C.I.E. Other buildings during this period included an ultra-violet light treatment hall donated by the officers of the Madras Police, the Jalan Guest House for relatives and other visitors to the Sanatorium. The bed capacity had been increased to 261 in the decade.

Work on the diagnostic and treatment side continued to develop. By the end of 1945 811 thoracoplasty operations had been performed, 1063 thoracoscopies with cauterization of adhesions, and other operations. Medical treatment had not changed much except that promin was given a short trial. The laboratory work grew considerably and one great advance was the introduction of cultures for tubercle bacilli which made possible much of the later research work.

In 1939 Dr. C. Frimodt-Möller was called to New Delhi to become the Medical Commissioner of the newly formed Tuberculosis Association of India, a position he held for a little over two years when he had to retire because of ill-health. He died in Kotagiri, Nilgiris, in March 1943. Mrs. Frimodt-Möller who had been associated with him in all his work in the Sanatorium and herself looked after the elementary school in early days, began the Ex-Patients' Colony, the Nursery School, and heiped in the office from time to time, is now living in retirement in Denmark.

During this period members of the staff contributed to the knowledge of tuberculosis by giving many lectures in conferences and in public meetings, and many papers were published, even as many as ten in a single year. This all had their influence in tuberculosis work throughout India, some of the papers being of temporary value, others such as one on what came to be called ' Tropical Eosinophilia ' by C. Frimodt-Möller and Barton being still referred to in medical literature,

It was in 1938 that Dr. K. T. Jesudian, the present medical superintendent, and Mr. V. M. Mathew, the present secretary and treasurer and business manager, joined the staff, although Mr. Mathew had been looking after the Ex-Patients' Colony even before that. In 1939 Dr. J. Frimodt-Möller, the present research director, joined the Sanatorium but he had spent one year on the staff eight years previously.

The Fourth Decade—The Dawn of a New Era in the Treatment of Tuberculosis

The decade, 1946-55, saw a revolution in the treatment of tuberculosis. First, in 1948, Streptomycin, was introduced, followed in 1949 by PAS, and in 1952 by INAH, and this antibiotic and two drugs have become the standard treatment in tuberculosis. At the beginning the work was largely experimental, experience having to be gained in dosage, frequency of treatment and length of treatment. These drugs became available to the Sanatorium for trials before they came on the market. Laboratory work was considerably increased specially in the study of development of resistance of the tubercle bacilli to these drugs.

The success of drug treatment made a complete change in the surgical work and by the end of the decade artificial pneumothorax treatment had almost completely ceased to be used. On the other hand more advanced chest surgery was taken up. In 1954 Dr. Jesudian went for a year to Vellore to study under the well-known chest surgeon, Dr. R. B. Petts, Dr. Francis Joseph to study anaesthesia, Dr. T. S. Muthiah to England under a Colombo Plan Scholarship to study chest surgery, Mrs. V. Asirvatham, a nurse, to gain theatre experience in England, and other nurses to Vellore. Dr. Jesudian had previously had a study period of over one year, 1947-1949, in Europe and America under a Government of India Scholarship.

In 1947 there was a very important and far-reaching development in the field work of the Sanatorium; this was the beginning of the Madanapalle Tuberculosis Campaign—a special scheme for controlling tuberculosis in a given area. The Government of India accepted the WHO offer of a team to organize a BCG programme, and chose Madanapalle as the place in which to begin. The BCG campaign was inaugurated by the Union Health Minister, the Hon. Rajkumari Amrit Kaur, and the Director-General of Health Services, Dr. K. E. C. K. Raja, the Deputy-Director, Col. C. Mani, the Surgeon-General and Director of Public Health, Madras, and many others were present on the occasion. Since that time the field work, based on Madanapalle, under the direction of Dr. J. Frimodt-Möller, has played a large part in the work of the Sanatorium. The work soon took in the whole population in an area about ten miles round Madanapalle, some 60,000 to 70,000 people. At the end of the decade the Sanatorium was asked by the ICMR to be responsible for one of the six areas chosen for the National Tuberculosis Survey of India, and was responsible for surveying some thirty villages, six towns and one city, in Andhra, Mysore and a small section of Madras State. This was an X-ray survey with mobile

Dr. J. Frimodt-Möller, Research Director and Staff, 1965

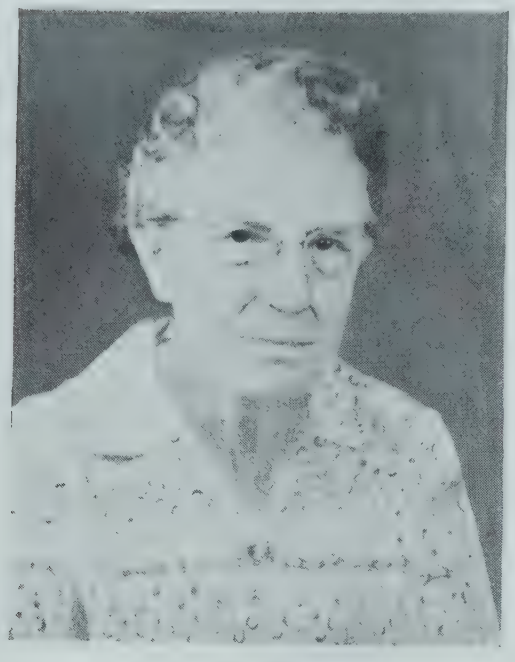
The Cunningham Light-Treatment Hall

Light treatment out of vogue, ' Cunningham ' Hall is now Statistical Department installed with IBM equipment

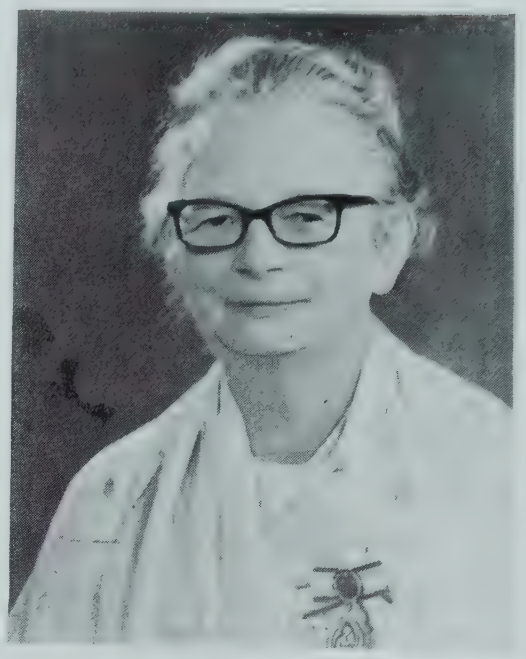
Aerial view from south-west, 1965 (the large building in the foreground is the Children's Hospital)

Close-up of Northern Sector with distant hills

FORMER NURSING SUPERINTENDENTS

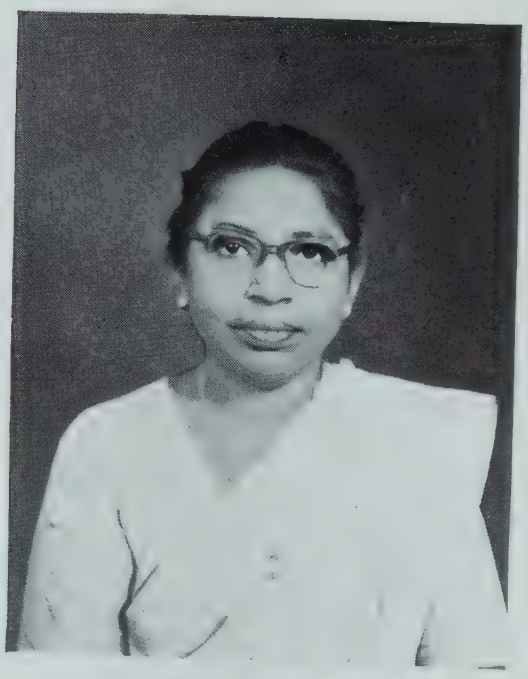


Miss M. K. Blair



Miss Ellen Lund

Miss Sofie Krohn



Miss Alice Zachariah

units, followed up by laboratory examinations of all showing X-ray abnormalities. This lasted for nearly two years.

In 1950 the Rajkumari Hospital, was opened in Madanapalle to take care of patients discovered in the local survey. Some ex-Army Nissen huts were made use of together with some buildings loaned by the Government.

Another advance made during this period was the beginning of treatment of children suffering from tuberculosis. A few had been taken in before, but treatment of children among adult patients was not very satisfactory. On July 19th, 1955, the great event was the opening of the fine hospital for tuberculous children, by Rajkumari Amrit Kaur, the cost of the building having been given by the Central Government. The hospital included accommodation for children of all ages beginning with babies, and had sections for isolation, for children suffering from pulmonary tuberculosis, and for orthopaedic cases, altogether 76 beds, with nurses' duty rooms, doctor's room, treatment rooms, dining room, school room, store rooms and the usual offices. On the same day was the opening of an extension of the thoracic surgery building. In connection with the treatment of children Dr. P. V. Benjamin went to England for study under a Colombo Plan Scholarship.

In 1948 Dr. P. V. Benjamin went to Delhi as Adviser in Tuberculosis to the Government of India, a position which he held until his retirement in 1962.

During this decade the teaching of doctors for the TDD Diploma continued and usually classes of six doctors were taken. There was some change in the set-up of the course as from 1955 the course was based on Vellore Christian Medical College and the Sanatorium, four months being spent in Vellore and eight months in Arogyavaram. Many others came for short periods of instruction, and visitors from India and from abroad to study specially the field work were numerous.

As previously the staff gave many lectures and many papers were published dealing with clinical, laboratory, and epidemiological aspects of tuberculosis.

The Sanatorium school for staff children was enlarged and became a Higher Elementary School with seven standards in 1947, with nearly 300 children including some from neighbouring villages, and eleven teachers.

The Ex-Patients' Colony did not expand very much in the number of ex-patients it could take, but improvements were made in the printing section, and in the Colony shop in the Sanatorium. Good use was made of the special building in the Colony opened by Her Excellency Lady Linlithgow in 1940.

The Fifth Decade—Increasing Emphasis on the Field Work

In the decade 1956-65 in the clinical side of the work, the surgical service was increased, and on an average some 40 to 50 lung resections have been done annually. Many of these have been done in children for whom this type of operation has been particularly effective in such lung diseases as bronchiectasis,

hydatid disease, congenital cystic disease as being the only way to help them. The result has been a full children's hospital as many are referred to for this service by institutions and by private doctors. An increasing number of orthopaedic patients have been admitted into the Children's Hospital and for these operative treatment has been given both by the surgeons in the Sanatorium itself with the benefit also of visits by the orthopaedic surgeon of the C.M.C. Hospital, Vellore, who comes from time to time bringing with him undergraduates from the Vellore Medical College who welcome this opportunity of observing orthopaedic cases not easily seen elsewhere.

The standard drug treatment continued to be with streptomycin, PAS and INAH, but small trials were made with the so-called 'salvage drugs' for patients whose bacilli became resistant to the main drugs or who failed to respond to other treatment; a drug more recently tried has been Cycloserine by which many patients have been made fit for operation.

The number of beds was gradually increased to 420, additional accommodation being found by making some of the larger special wards suitable for treating several patients in each ward for those sent by railway administrations, and by Orissa Police and some other bodies. Because of the success of modern therapy by private practitioners there was not so much demand for the special ward type of accommodation. There still remained however a long waiting list of poor patients, and so the general wards have always been full.

In the latter part of the period there has not been much demand for the training of doctors; the training of laboratory technicians has continued, classes of about 12 being taken each year.

A number of improvements in buildings have been made, the laboratory has been extended, and a day nursery has recently been completed. The Sanatorium School became a middle school, and a section with English medium has been started.

The main development has, however, been in the field work. The Madanapalle Research Unit is engaged in two major enquiries. The first is a study of the tuberculosis epidemiology and the effect of modern tuberculosis control methods in a rural population of about 60,000 people in and around Madanapalle; the second a study of the community effect of domiciliary drug therapy in a number of small towns within 100 miles of Madanapalle. More recently a new study has been undertaken into the various strains of acid-fast bacilli, particularly atypical strains encountered. This last study is a joint one with the United States Government and financed by a grant from PL 480 funds. The other studies were financed by grants made by ICMR. A large and highly trained staff has been gathered together for this work, and the centre is a large building rented in Madanapalle.

In 1958 Dr. J. Frimodt-Möller was appointed director of this Research Unit, and Dr. Jesudian became Medical Superintendent of the Sanatorium clinical section.

New Nurses' Home

New Staff Quarters

Dr. E. Somasekhar, F.R.C.S.(E)
Present President

STAFF WITH SERVICE OF TWENTY-FIVE YEARS AND OVER

Mr. P. K. Mammen
General Supervisor, Research Section

Mr. M. S. Gnanapragasam
Chief Motor Mechanic, Research Section

Other changes in staff included the retirement of Miss E. Lund as Nursing Superintendent in 1957 after about 25 years of service. She was succeeded by Miss R. Madsen who had joined the Sanatorium in 1949, coming to India from China. Dr. P. V. Benjamin resigned in 1963 to take up tuberculosis work in Ambur. Rev. R. M. Barton retired in 1962 and afterwards took up work in Mysore.

Little has been said up to now of the religious background of the Sanatorium. It was founded on faith in God and its work has been carried on by men and women who have striven to witness in their life and work the faith they had in Jesus Christ. The President of the Sanatorium in his speech on the occasion of the Silver Jubilee began with the quotation ' According to your faith be it unto you ' and the years that have been since the Sanatorium began have amply witnessed to the truth of this statement. Another statement on the same occasion spoke of the contrast between the work in the Sanatorium, healing the sick and repairing human wreckage, and the destruction which was going on in many parts of the world. The institution was a very signal and special example of the fruits of Christian civilization, which the destruction and devastation of aggressors was seeking to destroy. The story of the work in the Sanatorium during the twenty-five years would strengthen faith in eternal values, and would increase a confidence, above all in those who benefitted by its ministry, that these values must prevail over the evil forces that threatened. The years that have followed have only amplified what was said at that time. Those on whom has rested the work of carrying on the Sanatorium have always looked to God to guide and provide, and they have not been disappointed. The religious side of the Sanatorium has gone on in a quiet and unobtrusive way, beginning with its daily morning worship, services on Sundays and special meetings on other occasions, but the principle has always been that participation in all this side of the work is perfectly voluntary, and yet in spite of this, and perhaps because of it, many have found their faith in God and what He has done and is doing, has been strengthened or even brought into existence where it was not before.

In the past fifty years the Sanatorium has depended on a great many men and women of different races and origins, on the co-operating bodies who all the years have been behind the work and sending their representatives to meetings of the Governing Body and its committees, to the gifts of many others including states, firms and a host of private individuals ; to a great many members of staff who have faithfully served, some devoting most of their lives to the Sanatorium such as Miss Grace Suriawanshi, Miss Dayanidhi, Mr. Jared Samuel, Mr. P. K. Mammen, and a large number in more humble employ, besides those mentioned earlier in this story. These have all looked to God and have not been disappointed and we of today have inherited the results of their labours. Praise be to God who called them, and may those who follow be found worthy of this great heritage.

CHANGING OUTLOOK ON TUBERCULOSIS

Dr. P. V. BENJAMIN

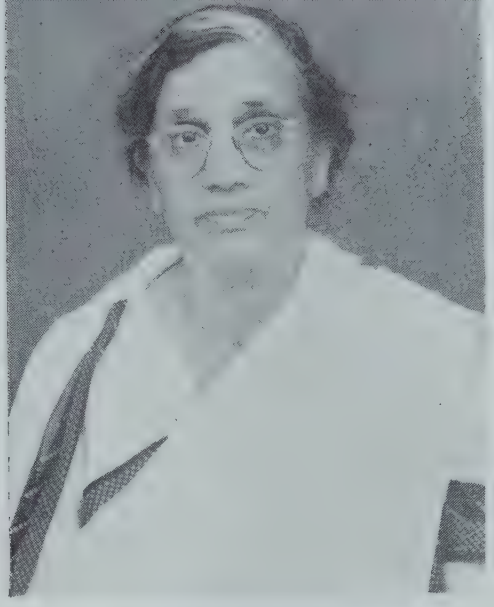
Changes are taking place all around us. Old ideas about many aspects of life are being revised and this is being reflected in our approach to problems of medicine including tuberculosis control, though here, the changes may not be so marked as in some spheres such as atomic development and space travel.

One of the most revolutionary changes that has taken place during the last two decades in tuberculosis control and treatment is the discovery of new antibacterial drugs and their extensive use. Till a few years ago the prospect for a tuberculosis patient was rather bleak and depressing, and therefore a patient and his family viewed the possibility of being tuberculous with fear and trembling. That attitude is changing.

From the early part of this century till quite recently, the best recognised method of dealing with the tuberculosis problem was treating tuberculous patients in sanatoria or hospitals. One bed for every annual death due to tuberculosis or one bed for every thousand population was the standard accepted. During this period there was considerable advance in certain forms of treatment called ' collapse ' therapy, such as pneumothorax, thoracoscopy and cauterization, thoracoplasty operations and other ancillary surgical procedures such as phrenic nerve evulsion, oleothorax, extrapleural plumbage and cavity drainage. Most of these forms of treatment needed hospitalisation of patients for varying periods. Enthusiasm for these methods was more or less universal from 1906 to about 1945, but this began to wane sometime about 1940. Since then advocates for more drastic surgery increased so much so that surgical treatment for lung tuberculosis at present, is mainly confined to excision surgery, where whole or part of a diseased lung is removed instead of the earlier method of collapsing such a lung. The ' collapse ' therapy methods occupy only a very minor place at present in the treatment of pulmonary tuberculosis and in some places, these have been completely abandoned and replaced by resection surgery.

More important than any of these changes, is the realisation of the fact that the majority of tuberculosis patients can be treated by the new drugs without resort to surgery. Even the advocates of surgery now consider that only about 10 percent of pulmonary tuberculosis cases may need surgical intervention.

Mr. T. Perumal, Works Manager



Mrs. A. Sandhy, Linen Store-keeper

Sri Akkulappa, Labourer

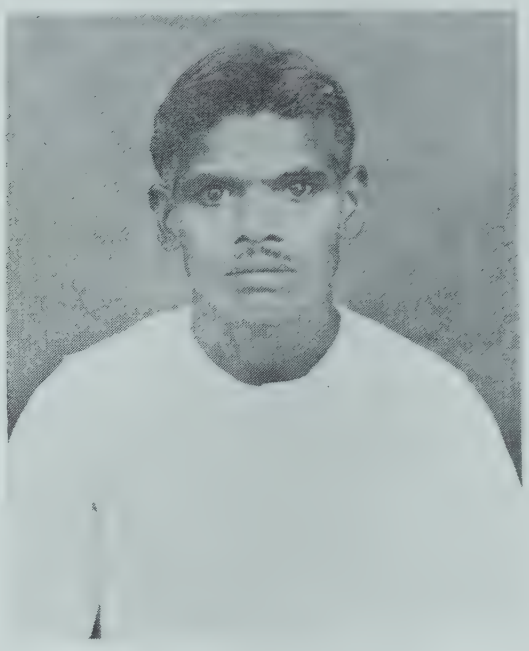
V. Pragasam, Ward-aid

P. Soundera Rajan, Ward-aid

Miss Mary Isaac,
Senior Sister, R.A.K.T. Hospital

Mrs. P. Devasundaram
Senior Sister, U.M.T. Sanatorium

Miss Susan Philip
Senior Laboratory
Technician, U.M.T. Sanatorium



Venkatappa Devadanan
Ward-aid

K. Narayanan Nair
Cook

M. Venkatappa
Kichen-aid

It may be worth mentioning that chest surgery, in the earlier years was mainly concerned with the treatment of tuberculosis, but now it is done mainly for non-tubercular conditions, such as cancer, lung abscess, bronchiectasis and more recently for conditions of the heart; and surgeons usually get much better results in some of these cases than in purely tuberculous ones.

For many years it was obvious to those responsible for tuberculosis control in India, that it would be impractical to apply most of the measures which were used and found successful in Western countries in dealing with tuberculosis problems. According to this standard India should have had at least 500,000 beds. At present there are only about 30,000 beds in the entire country, and the annual rate of increase of these beds, even after special efforts connected with the five year plan programme, has been less than 400 during the last 15 years.

The advent of effective drugs for tuberculosis made it reasonable to consider the possibility of treating a large number of tuberculosis patients in their homes. This is now accepted as one of the more significant activities of the National Tuberculosis Control Programme in India. This home, or domiciliary treatment programme, has to be carried out from a tuberculosis control centre, till now called a tuberculosis clinic. There are about 225 tuberculosis clinics in India. Ideas about the functions of these clinics are also changing. Instead of these serving as outpatient clinics doling out some medicines, they have to function as tuberculosis control centres for the areas around. At present these Control Centres are planned to serve a district comprising 1 to 1½ million population. About 400 such Centres need to be developed during the next 10 to 20 years. At present there are only about 40 such ones established and functioning even partially.

The treatment of tuberculosis patients in their homes is not so simple as it may appear at first, though it is much cheaper than institutional treatment. Numerous problems such as finding the cases, especially the infective ones, and treating them sufficiently long with the drugs to get a cure are there. Researches and investigations are already being done in India to find out how some of the problems can be overcome. The Madras Chemotherapy Centre, through their studies, have found an answer to some of these problems—the most important being that home treatment with drugs is as good as sanatorium treatment if properly done, and the danger of these patients infecting those with whom they are living is not so marked as was first feared provided effective treatment of patients is instituted. Another problem that is being investigated in another place is, how far the existing health organisations in the country can assist in the domiciliary treatment programme carried out from tuberculosis control centres referred to earlier and what contribution voluntary organisations such as Tuberculosis Associations can make in supplementing Government efforts, especially in motivating patients to accept and continue drug treatment long enough to effect cure. Christian institutions have also to play a part in this community Control programme for tuberculosis.

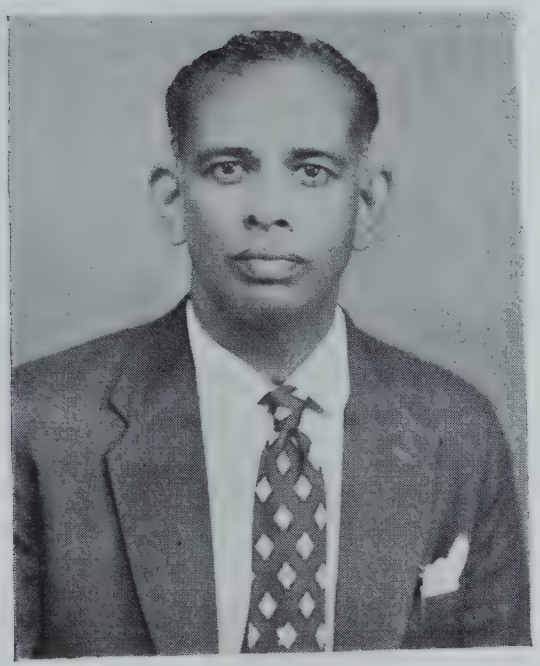
What is needed most at present is a co-ordinated effort in which the home treatment and other tuberculosis Control methods for the community can be made to dovetail to achieve the best results. Here the limited number of beds available in the country has also to come into the picture. Even though the 30,000 beds now available are not adequate, they can be made to fit into the wider scheme whereby these beds can be used most economically and effectively.

The day when a TB Sanatorium or hospital can develop its own way as an isolated institution is long past. Whatever may have been the reasons that justified the starting of sanatoria in the earlier years as isolated institutions in out of the way places these reasons are not valid any more. In fact, there is need for a complete re-apprisal. The existing institutions and the new ones that may be started have to be made to fit into a plan where these will be associated with the larger programme of community control. The policy of admission of patients who should be given preference for this, and what should be the period for which a patient should normally occupy one of the limited number of beds, have to be worked out and regulated by a Central authority or a group of Tuberculosis workers serving in an area.

In this some provision has to be made for dealing with patients who develop drug resistance during the course of domiciliary treatment. A well equipped laboratory for testing drug sensitivity would be an essential part of such institutions. The drugs that are to be used to salvage patients who are resistant to the commonly used drugs needs special observation as most of these drugs are too toxic to be generally used in home treatment.

There are also other advances in tuberculosis control methods that have come into prominence in recent years. B.C.G. vaccination is one of them. Though B.C.G. was discovered in the 1920s and was used rather widely from the 1930s as a preventive vaccination in some countries, there is still some controversy as to its efficacy. Reference may be made to the now classical research conducted by the British Medical Research Council and the results of it published in the Medical Journal during 1956-1958.

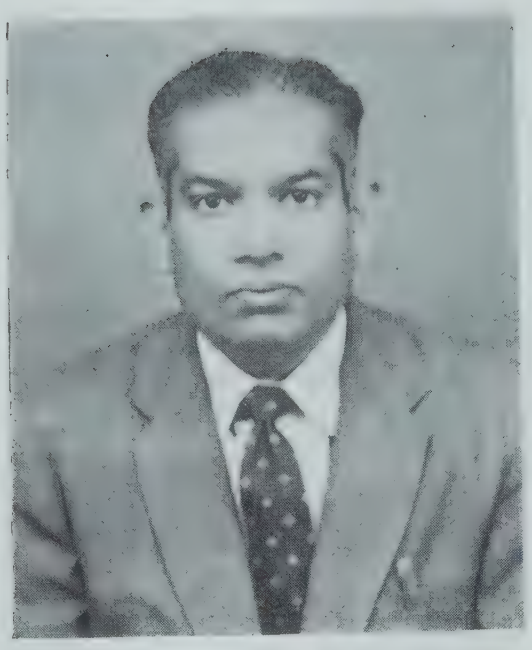
The field research section of the UMT sanatorium has also contributed some knowledge in this respect. It will suffice to quote the opinion of the Tuberculosis Expert Committee of the WHO, September 1959, 'Existing knowledge and experience show that B.C.G. vaccination can give a considerable degree of protection against tuberculosis ; that the inconvenience and risks associated with the vaccination are insignificant ; that it can be applied on a mass scale at costs and with personnel which any country can afford and in a way which is acceptable to the population ; and it is therefore the considered opinion of the Committee that B.C.G. vaccination should have an important place in and form an integral part of the tuberculosis programme in most countries.' Though B.C.G. is not a recent discovery, its wide application all over the world with the help of UNICEF and WHO is a recent advance and the confidence that we have in its usefulness is also recent.



Dr. K. T. Jesudian
Medical Superintenden

Mr. V. M. Mathew
Business Manager, Secretary-Treasurer

Visit of H.E. Sri Bhimsen Sachar, Governor of A.P., with Dr. K. T. Jesudian, Medical Superintendent, and Sister Alice Zachariah, Nursing Superintendent



Dr. T. S. Muthiah
Asst. Medical Superintendent

Miss R. Madsen
Nursing Superintendent

Staff Hospital

It was fortunate that WHO was formed about the time of our independence and at a time when we were having plans to make a concerted attempt to control tuberculosis in the country based on the earlier report of the Health & Survey Committee of the Government of India commonly called the Bhore Committee's report. Many of the schemes drawn up in India after 1947 had the active support of WHO and UNICEF. WHO has contributed liberally by giving equipment and personnel for several important research projects in tuberculosis especially the Chemotherapy Centre, Madras, and the Field Research Project, Madanapalle. WHO and UNICEF have also helped in starting a few tuberculosis teaching and demonstration centres in different parts of the country and have contributed a good deal in establishing and developing the National Tuberculosis Institute in Bangalore and its programmes for control of tuberculosis in the community.

Our ideas on rehabilitation of the tuberculous have also changed considerably in recent years. The success that is associated with the home treatment of tuberculous patients using the new drugs is one of the main reasons for this change. In the past the treatment of a patient was usually a prolonged one and that in a Sanatorium or hospital necessitating the patient being away from normal life for long periods sometimes for years. The relapse rate even after such long treatment was rather high. Hence most of the patients had to be gradually trained to restore their working capacity under sheltered working conditions which included strict and constant medical supervision. This was usually done through what was known as ' ex-patients ' colonies where industries or other types of work suited to the limited capacity of an ex-patient was provided. With the treatment in the home, the patient in most cases can carry on the treatment while continuing their occupation with only short periods of break or rest in certain cases. What is needed now for rehabilitation is not so much an ex-patients colony or settlement, but some work centres near the patients' homes where they or their relatives can be trained for comparative short periods in what is known as ' cottage ' industries which they themselves can use in course of time in their homes. However, there are likely to be a few whose lungs are so badly damaged needing a sheltered life and some provision has to be made for these.

These advances are reflected in the overall plan for tuberculosis control. The emphasis is now gradually being placed on what is called the community control of tuberculosis, using extensively preventive methods. Spending large sums of money on building sanatoria and hospitals and following the costly procedure of treating patients in in-patient institutions is not needed now, nor is there need for ex-patient colonies. This change is particularly important for the developing countries of the world where the resources both in finance and highly qualified personnel, needed under the old system, are very limited. The common idea that the treatment of tuberculosis can at best be only partially successful and that too only in sanatoria and hospitals, has changed. Even if

this change had not taken place, it would have been beyond the capacity of many countries to achieve anything tangible in a foreseeable future by following this method.

There is a growing realisation that the training in tuberculosis for both under-graduates and post-graduates has also to be changed considerably to fit in with the changing outlook on tuberculosis. The T.D.D. courses now followed were designed over 20 years ago, and in many respects these are out-dated and need revision. The Indian Medical Council and the Universities are having discussion regarding this.

Another remarkable change in the outlook on tuberculosis that is taking place in most of the developed countries of the world is with regard to the possible eradication of this disease. Tuberculosis has been controlled in these countries. The annual death rate which was about 100 per 100,000 population some fifty years ago, has come down to less than 10 in many countries, so much so that they are now actively discussing the possibility not only of controlling but of eradicating this disease altogether from their countries. Whether this is possible or not has yet to be seen, but we in India and other countries similarly placed, can at present think and work only for the *control* of tuberculosis. There is a real possibility now in achieving this, if we actively make use of the modern knowledge regarding prevention and cure, and work out a co-ordinated scheme. The outlook from being one of frustration has changed to one of optimism.

LEARNING ABOUT TUBERCULOSIS

Dr. J. FRIMODT-MÖLLER

Apart from the benefits rendered, thousands of patients suffering from tuberculosis who have had their health restored by their stay in the Sanatorium, the major contribution to the peoples of India by the Union Mission Tuberculosis Sanatorium during the 50 years of its existence has been the information and knowledge about tuberculosis it has gathered by the study of the disease in patients and in the community. Hand in hand with the constant probing into the nature of the disease and its management has gone an effort to disseminate and share with others the new knowledge acquired.

From the very beginning of the Sanatorium a tradition was created which stimulated research into all aspects of tuberculosis. Good research requires meticulous recording of observations, preservation of all records and a system by which data are readily available for analysis. Further, review and analysis of the records must be done at regular intervals. All this was instituted from the start of the Sanatorium. Patients' case sheets, or 'chart books' as they were called, became the most important items in the daily life of the Sanatorium, and they were soon regarded with the awe usually reserved for sacred books. It was a firm rule that no 'chart books' could be lost—if one was missing, it had to be traced immediately. The result is that the Sanatorium possesses an unbroken series of records dating as far back as 1912 when the Sanatorium began to function in all modesty on the compound of the mission hospital at Madanapalle. Later on, it became a firm tradition that all X-ray films should be preserved as the property of the Sanatorium and always be available for review at short notice. Laboratory records were maintained and preserved with equal care. Considering the large terrain over which case sheets had to travel daily and the great number of different persons who had to deal with them, many of whom rather uneducated, it is no mean achievement to have built up this unique archive of records, the contents of which form a veritable gold mine of information for anyone who wishes to study trends of tuberculosis in India.

The publication of annual reports has been a great inducement to constant review of the cases as well as of the performance of various treatments given to the patients. From that has flowed many other studies dealing with important aspects of diagnosis and treatment.

A simple study of the published annual reports can lead to interesting observations. As an example, a quick study has been made of the results of treatment throughout the 50 years by noting the percentage of patients who obtained sputum conversion every fifth year, that is, those who got rid of the tubercle

bacilli as a result of the Sanatorium treatment. *Fig.* 1 shows that during the period before modern drugs became available, not more than about 45% obtained negative sputum, and during the War years when collapse therapy was used most intensively the results were even poorer—probably because of the admission of many more, very advanced cases than before. Thereafter the curve rises steeply till a maximum of about 75% in 1955 corresponding to the introduction of the new drugs such as Streptomycin, PAS and Isoniazid. But then there is a change as the results in recent years have again become poorer. This downward trend reflects the increased number of patients whose bacilli have become resistant to the new drugs, and who therefore will not benefit from these drugs anymore.

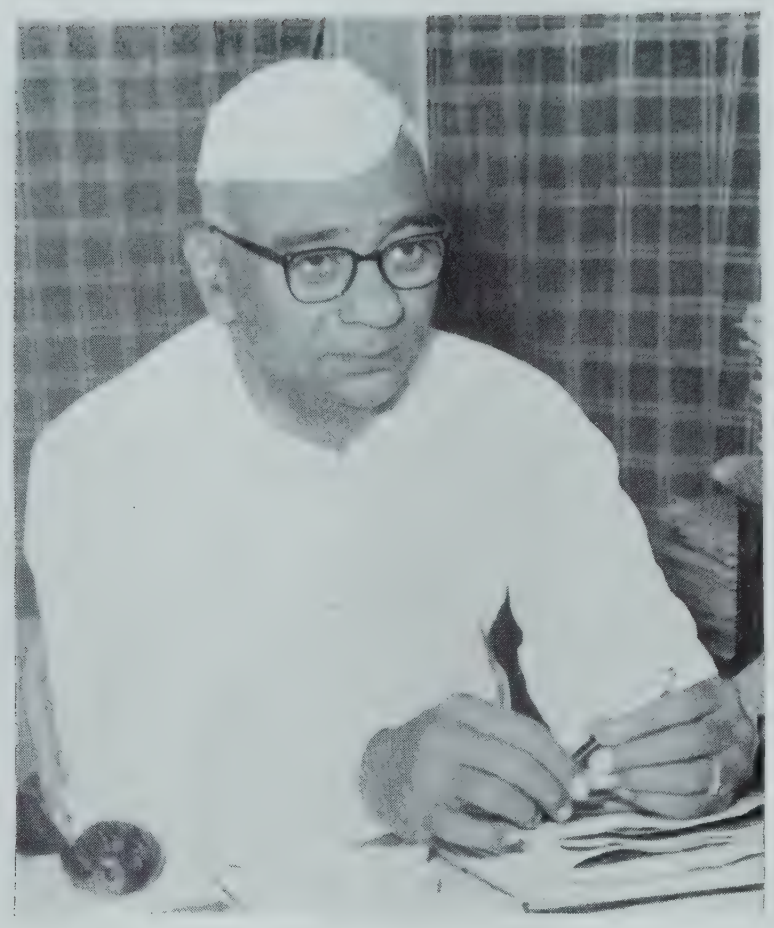
Another interesting and quite unexpected observation was made by browsing through the annual reports and studying the age of the patients on admission from year to year. It was found that there has been a steady increase in the average age of both males and females throughout these 50 years. As shown in *Fig.* 2, the mean age of male patients has gone up from 26 to 36 years and of females from 22 to 30 years. What this means is not easy to say without studying the problem in much more detail. If major changes in the admission policy of the Sanatorium, or in the sections of the population from which it draws its patients, could be ruled out, the steady rise of the average age of patients suffering from tuberculosis could mean a fundamental change in the epidemiological picture of the disease in this country. Judging from the experience of countries in the West where the disease has largely disappeared, such a change could herald a real decline in the prevalence of the disease, and it could hold out the first olive branch indicating that in India too the disease may be on the way out.

These examples illustrate the immense value of the records kept so faithfully by the Sanatorium for so many years.

REPORTS

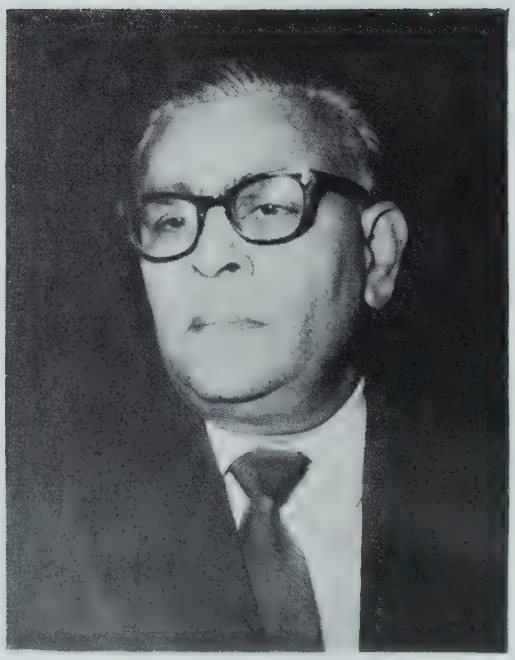
The impetus to produce reports on aspects of tuberculosis was greatly stimulated by two events : the issue of special tuberculosis numbers by the *Indian Medical Gazette*, beginning in 1937, and the establishment of the tradition of holding regular annual conferences for tuberculosis workers in India, beginning in November 1939. Both events were largely the outcome of efforts by the Sanatorium staff. The tuberculosis workers' conferences have been held regularly year by year (except for a break during the war) under the aegis of the Tuberculosis Association of India who owes so much to the two pioneers, Dr. C. Frimödt-Möller and Dr. P. V. Benjamin, who guided its destiny from its inception in 1939 till a few years ago.

Dr. K. T. Jesudian, Medical Superintendent and Staff, 1965

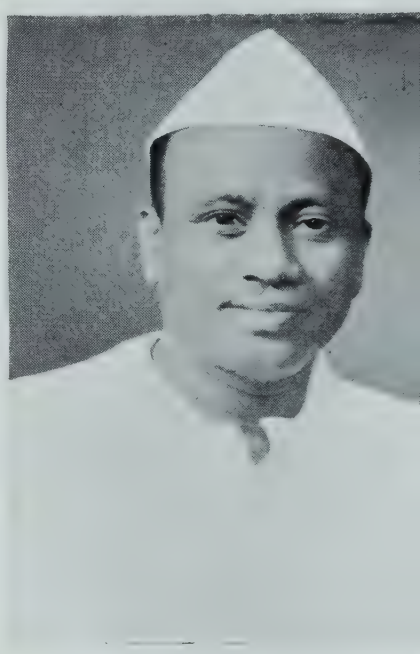


The Hon'ble Sri K. Brahmananda Reddy
Chief Minister, Andhra Pradesh

The Hon'ble Dr. M. N. Lakshmi Narasiah,
Minister for Panchayati Raj, A.P.



Major K. N. Rao, M.D., Director of Health Services, Govt. of India.



The Hon'ble Sri B. V. Guru
Minister for Labour & Transp

TREATMENT

It is only natural that the attention of the workers of the Sanatorium was first occupied with how to find the best treatment for pulmonary tuberculosis. From 1921 artificial pneumothorax became the standard treatment of patients whose pleural space was not obliterated by adhesions. To improve the collapse of the lung after induction of air in the pleural space if adhesions were present, thoracoscopy with cutting of adhesions by cauterization was soon introduced. Other attempts to influence the disease in the lungs were made by the use of paralysing the diaphragm by cutting its nerve, or by raising the position of the diaphragm by admitting air by injection into the peritoneal cavity. If these attempts failed, recourse was taken to produce collapse by an extra-pleural pneumothorax, a fairly small operation by which the outer leaf of the pleura was peeled off from its attachment to the inner surface of the chest wall. The results of these efforts were analysed and described in a series of reports from 1937 to 1948 (1-5). Other measures were also taken up. In cases with large cavities, (i.e. big holes in the lung caused by the destruction of the lung tissue by the tuberculous inflammation) which were kept under tension owing to air being sucked into them from the bronchi, suction drainage *ad modum Monaldi* was tried (6) but was found to produce more complications than advantages.

Thoracoplasty operations by which a number of ribs over the upper portion of the lungs were removed in order to allow the lung to fall in and compress existing cavities was introduced in 1928 but taken up in earnest only after 1935. The first report appeared in 1937 (7) describing the results in 17 patients. Another report on results in the first 150 cases appeared in 1942 (8) and a major report covering the next 458 cases was published in 1951 (9).

By careful and detailed study of all the factors which contribute to the final result of these various treatments, the more it became clear that the chief factor determining the outcome of the treatment was simply the extent of the disease—the less the lung was involved, the better was the result, the more involved, the poorer the result. It was realised as time went on, that the absence of a suitable and comparable material of patients treated *without* these operations with which the patients operated could be compared, the more uncertain was the real value of such procedures (9). An attempt to measure the effect of a particular type of thoracoplasty operation such as an extrafascial apicolysis done at the time of a thoracoplasty operation by providing a suitable control material, was carried out by using this operation in half the patients and omitting it in the other half ; the choice of who should have it done was left to chance. Between January 1951 and October 1954, 171 patients had thoracoplasty done and 85 of these had extra-fascial apicolysis and 86 had not. The analysis showed no special advantage of the procedure (10). This experiment, we believe, is one of the few instances where an operative collapse measure in tuberculosis has been checked by trying to provide a comparable control group.

FOLLOW-UP

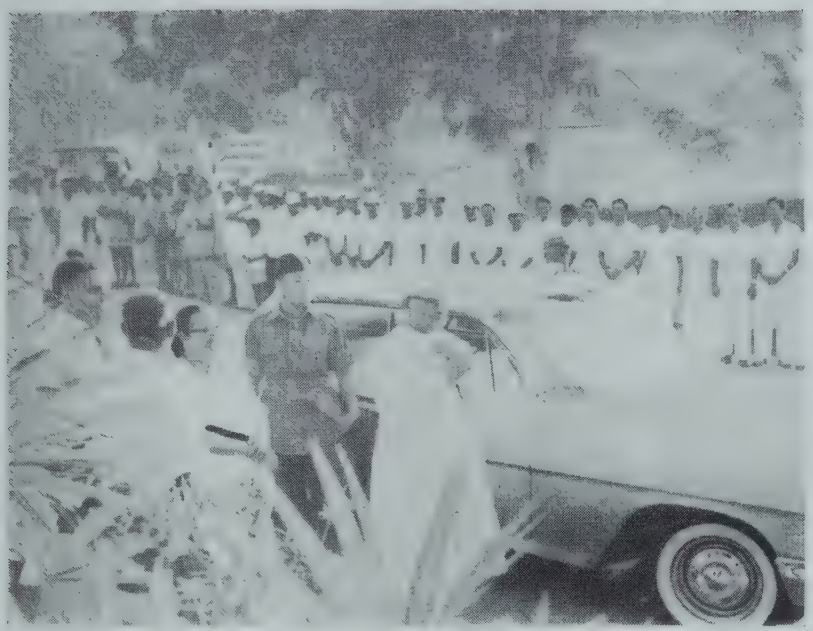
From time to time enquiries have been sent out to ascertain the fate of patients after discharge. The first enquiry covered the period 1916-30, and of 2604 patients discharged after having been treated for more than one month, 1695, or 65% were traced. All of these had been away for at least 5 years. The results were encouraging or discouraging according to the attitude of the investigator. Considering tuberculosis to be a near fatal disease, it was considered very encouraging that 53% were still alive (11). Looking back, one cannot but marvel at the optimism and indomitable spirit which agitated those early workers. To keep up a ' morale ' in face of the fact that 47% had died, and among those admitted with extensive lesions (' stage III ') even 75%, is most remarkable. A follow-up study ten years later covering the period 1931-40 was no more encouraging. Of 2677 patients discharged, 1516 or 57% could be traced. Of these only 50% were still alive—50% having died (12). Obviously, tuberculosis was in those years a most menacing disease.

MODERN CHEMOTHERAPY

During the war as well as after the war, reports appeared abroad about new remedies which could protect experimental animals against infection with virulent tubercle bacilli. Many investigations into their effect in man were carried out but for a long time these substances were either ineffective or too toxic. One drug called Promin had been tried out in animals in the famous Mayo Clinic in U.S.A. As so often before, the Sanatorium was one of the first in India to try out new remedies. Sixty-four patients were chosen in 1946 for the investigation and divided by random into two groups of which 31 received Promin daily by intravenous injection for 10 weeks, while the other 33 had no Promin. The results were judged by X-ray and general clinic condition. There was no advantage by giving Promin,—if anything, the control group fared better than the treated group. This experiment (13) is probably one of the earliest studies fulfilling the requirements of modern controlled trials.

With this negative result in mind it was no wonder that another new drug, streptomycin, was met in the Sanatorium with scepticism. However, the very first patients treated with this drug responded so well that all doubt about its specific effect immediately disappeared, and gave way to an exaggerated optimism which, however, had to be modified as time went on and more cases were treated. Not only could streptomycin at that time produce unwanted complications in the patients but the effect could be lost when the bacilli began to develop resistance against the drug (14).

Shortly afterwards another new drug by name para-aminosalicylic acid (PAS) became available. The Sanatorium put it immediately to the test. Two controlled trials with 39 and 58 patients respectively, lasting 8 weeks,



H.E. Sri Pattom Thanu Pillai and Smt. Ponnamma Thanu Pillai—Recent visit to the Sanatorium

Meeting Senior Staff

Laboratory Building

Reading of cultures by Mr. V. Y. George, M.Sc., Chief Medical Technologist

were designed to give information about the proper size of the dose according to tolerance and effectivity. The trials showed clearly that PAS was a useful drug which could significantly improve the condition of a tuberculous patient (15). The next step was to try out treatment with combinations of streptomycin and PAS, and this was undertaken when a third drug made its triumphant entry into the world market. It was Isoniazid which in surprisingly small quantities would exert a very strong effect on tubercle bacilli either by killing them or by preventing them from multiplying in the human body. Early in 1952 several experiments were set up in the Sanatorium with Isoniazid involving at one time as much as about 260 patients which were divided into many groups according to sizes, of dose and frequency of delivery. The results were most encouraging (16). Then the three drugs were tried out in various combinations—one, two or three together—and it was found that 2- or 3-drug treatment offered a better safeguard against the development of drug resistance than when the drugs were given singly (17 & 18).

The new drugs became soon the main anchor in the treatment. Some of the earlier methods of collapse treatment were abandoned while some of the newer surgical methods were retained and even used to a greater extent as a result of patients being rendered operable because of the new drugs (19).

There is no doubt that modern chemotherapy with drugs and antibiotics is the most important discovery within the field of tuberculosis. It has completely altered the prognosis of persons afflicted with tuberculosis. Yet, there are still problems to be solved, particularly, how to deal with the emergence of drug resistant strains.

LABORATORY INVESTIGATIONS

Already in the early history of the U.M.T. Sanatorium the laboratory became a useful and most important part of the institution. There the search for the bacilli went on, and after having used only the microscope for the demonstration of the bacilli, culture work was taken up in the years 1937-39. This has gained immensely in importance as time went on, especially when it became clear that the new drugs could only operate if the bacilli were sensitive to them. The laboratory then took up methods to test the bacillary strains for drug sensitivity, and this is now a very essential part of its work (20, 21). Later on, bacilli isolated from patients were tested for virulence in the guinea-pig as it was found that Indian bacilli had a pattern of virulence which differed from that found in bacilli isolated from European patients (22, 23).

As the survey work mentioned below was developed, methods of finding bacilli had to be refined and made applicable to field work. This led to several studies in the use of laryngeal swab cultures, stomach lavage and various other types of sputum collection (24-29).

In the light of the increasing value of the bacteriological findings, other aspects of laboratory work diminished in importance. Whereas blood examinations by differential leucocyte counts and blood erythrocyte sedimentation rate had played a great role in the past as guide to diagnosis and effect of sanatorium treatment (30-32), they have now long ceased to be used. However, by the regular use of blood counts in the routine the Sanatorium came upon a new disease or syndrome which appeared with high eosinophile counts and an X-ray picture showing a characteristic mottling of all the lung fields resembling miliary tuberculosis. This syndrome (33, 34) later became known as *Tropical Eosinophilia.*

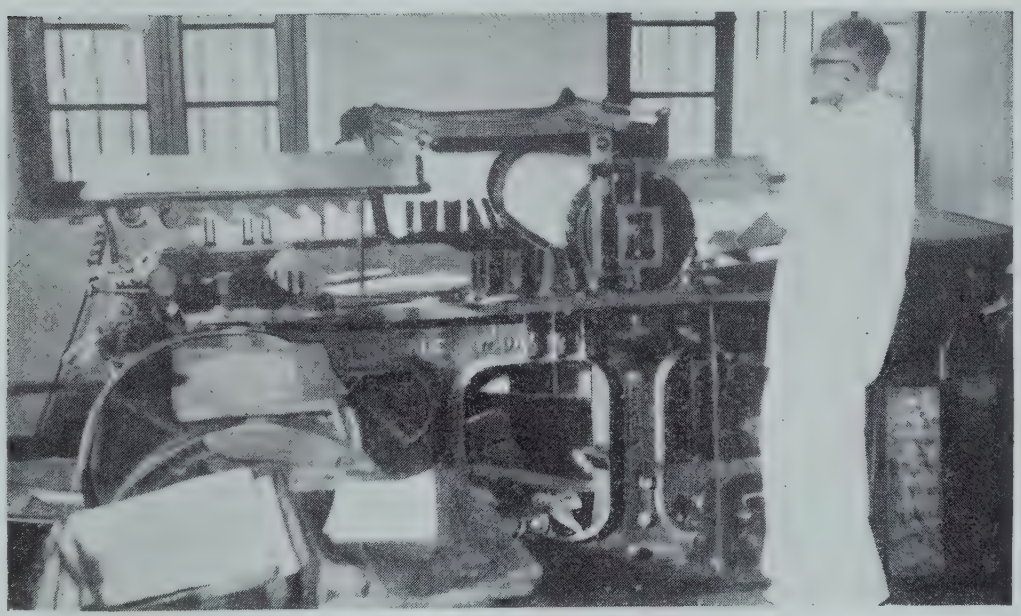
TUBERCULOSIS IN THE GENERAL POPULATION

From the very start of the Sanatorium it was the desire of its founders that it should not merely confine itself to the treatment of the patients who could find room within its walls but that it should also play an important role in the cause of combating tuberculosis in the land by devising methods of detecting the disease and controlling it. Therefore, after an initial period during which the Sanatorium got established and had found the best way of managing its patients, the first efforts were made to find out how much tuberculosis there was in the general population. This was done by carrying out surveys by examining samples of the population with tuberculin tests and noting how many showed reactions. Very little was known those days about the prevalence of tuberculosis in India. The first tuberculin surveys by the Sanatorium were carried out during 1937-38 in Chittoor District, partly in 3 taluk headquarters towns and partly in some villages ; a total of 6665 persons were tested. Several schools were also tested. It was found (39, 40) that 38% of the adults and 11% of the children reacted to Old Tuberculin given as the von Pirquest test. Muslims showed a higher rate of reactors than Hindus. Then followed a very important piece of work.

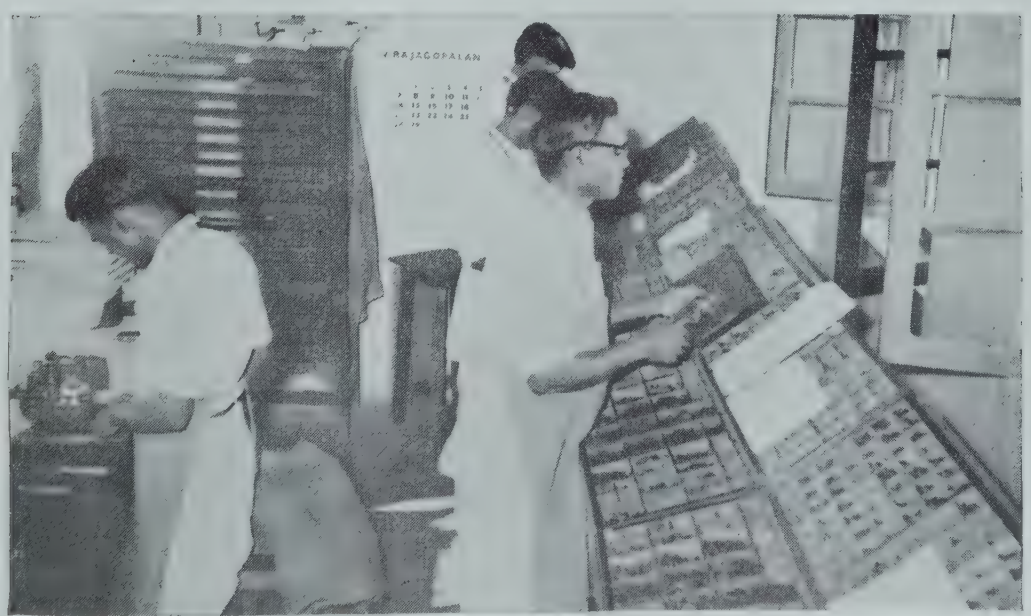
In the winter 1937-39 doctors from the Sanatorium carried out a sample survey of Saidapet, a suburb of Madras. About 10% of the population was tested with Old Tuberculin given as the Mantoux test. Of 3309 persons examined 58% showed reactions to tuberculin ; of the adults 70% and of the children 41%. X-ray examinations were done in as many persons as possible who showed strong reactions to tuberculin, and among them 33 were diagnosed as suffering from active tuberculosis requiring treatment, i.e. 1% of those tested. Tubercle bacilli were found in 8 cases, i.e. in about $\frac{1}{4}$%. From the number of patients dying from tuberculosis while the survey lasted, the mortality from tuberculosis was estimated to be about 460 per 100,000.

This survey (41, 42) is quoted in some detail, as it was one of the very first done in India which indicated the size of the tuberculosis problem. Although the survey covered only a very small fragment of the population in India, the findings of this survey has been of great importance. It formed the basis for

Lazarus Memorial Block installed with Powerlooms and
Power Printing Press

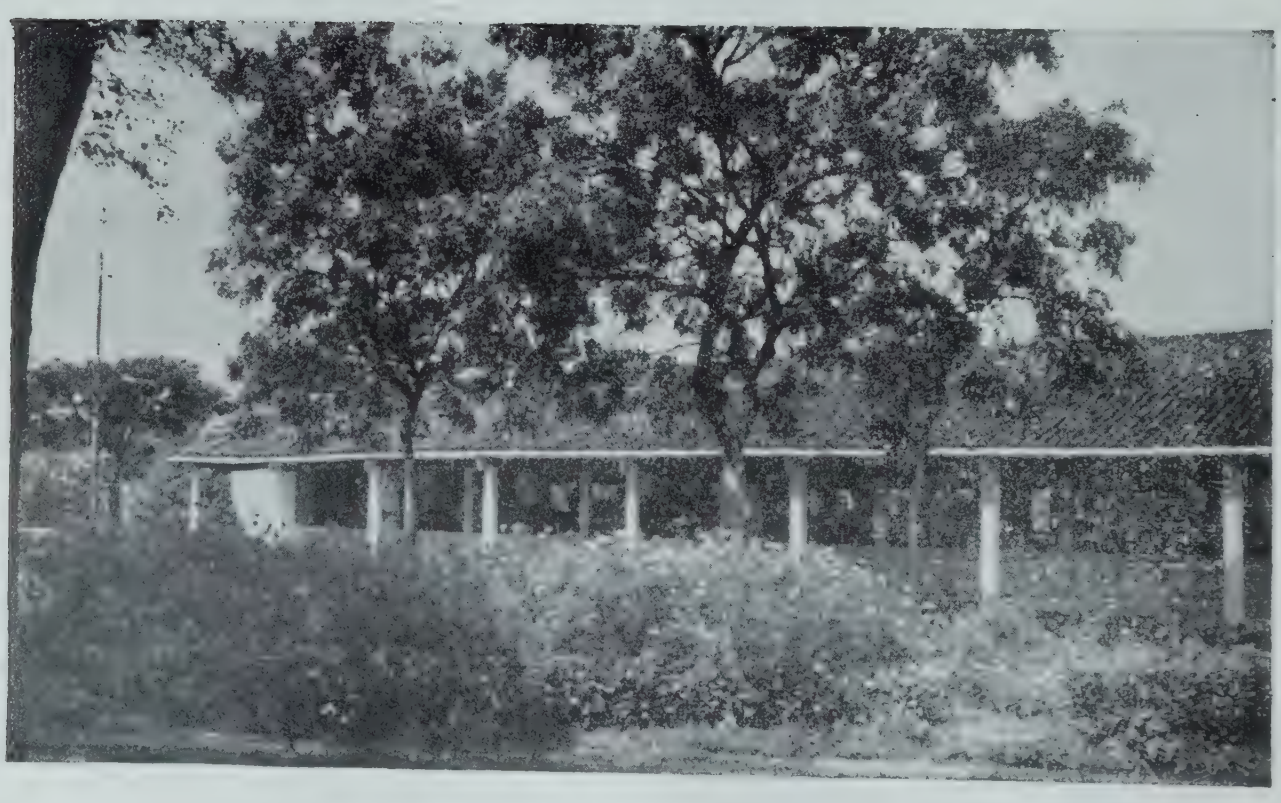


Power Printing in Progress



Composing in Progress

Men's General Ward (Interior) for Indigent Patients



Women's General Ward

the plans for controlling tuberculosis drawn up in the Bhore Commission Report which the Government of India published at the end of the war. The Sanatorium, however, was obliged to stop further surveys while the war lasted.

After the war an opportunity arose to resume surveys, and also to try out in practice how to set about to control and, perhaps, even to eradicate tuberculosis.

THE MADANAPALLE TUBERCULOSIS PROJECT

In 1948 the Government of India desired to introduce BCG vaccination in the country. Before doing so, the Sanatorium was asked to carry out a pilot study of the immediate effects of the vaccination. Accordingly, it was decided to test with tuberculin all the children and students in Madanapalle and vaccinate those who did not react. The BCG vaccination campaign in India was inaugurated by the late Rajkumari Amrit Kaur, Union Minister of Health, in August 1948, in Madanapalle. In the course of 6 months sufficient number of children had been vaccinated, retested and revaccinated to make it plain that BCG did not produce any untoward reactions in Indian children, so could begin vaccination elsewhere in India sponsored by the International Tuberculosis Campaign. In Madanapalle, the occasion was used to test the entire population, old and young, men and women, and also to X-ray them by means of a portable X-ray placed at the disposal of the Sanatorium by the Madras Provincial Welfare Fund.

It seems appropriate at this place to pay a tribute to the leading citizens of Madanapalle for their sympathy, understanding and never failing help when the BCG campaign was started in their town, and also during the following years whenever their assistance was called upon. Without that it would have been difficult to launch this new enterprise in public health.

The Madanapalle town survey aroused much interest when reports (43, 44) were presented to specialists at the annual tuberculosis workers' conferences, and also in circles farther afield. The W.H.O. through the leader of its Tuberculosis Research Office, Dr. Carroll E. Palmer—a highly respected, international research worker—visited Madanapalle and got aquainted with the work of the Sanatorium in this new field. With Dr. Palmer's and Dr. P. V. Benjamin's assistance a co-operative research between the W.H.O. Tuberculosis Research Office, the Directorate-General of Health, Govt. of India and the U.M.T. Sanatorium was initiated in January 1950. The aim was to set up a tuberculosis control programme in Madanapalle town and about 200 villages in its close vicinity with a total population of 50,000 (now 65-70,000). All cases of tuberculosis would be isolated in a special hospital erected by the Sanatorium on a Government plot of land in the outskirts of the town. The study population would be examined from time to time by tuberculin tests and mass X-ray photography.

The new scheme was put into effect during 1950. Since then this well defined study population has been surveyed up to 7 times by X-ray and 5 times

by tuberculin tests. The last X-ray survey has been completed now in May 1965. A unique scientific material has been created. Almost everyone living within the area has been X-rayed, in average 4 times. A wealth of information about the epidemiology of tuberculosis has been gathered and made available to the public through many reports (45-50).

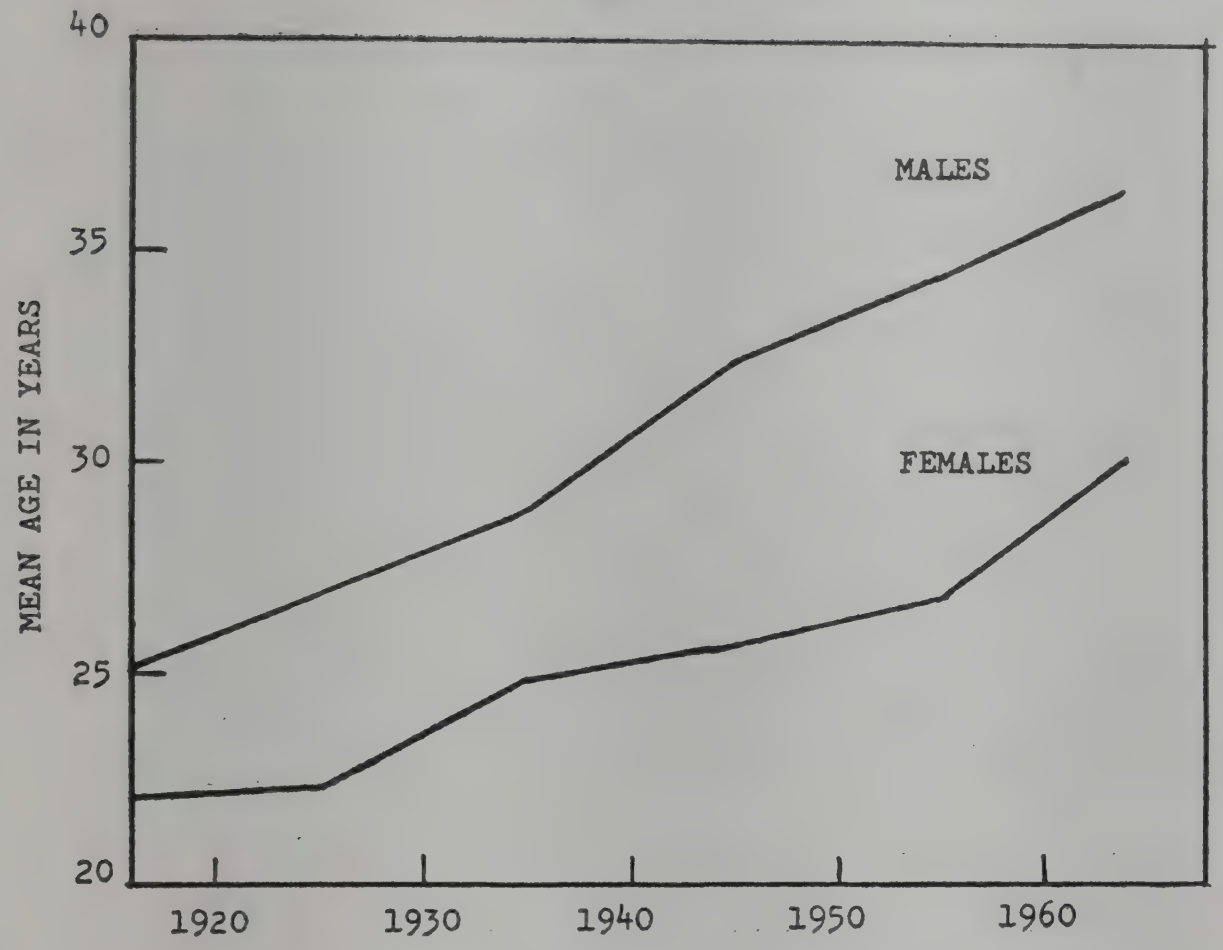
BCG VACCINATION

The observation on the effect of BCG vaccination was continued throughout these years. A special BCG Control Study was set up in November 1950 by which all persons showing evidence of not having been infected with tubercle bacilli by presenting a ' negative ' reaction to tuberculin were divided at random into two equal groups of which one was vaccinated with BCG and the other left unvaccinated in order to serve as controls. Those who reacted to tuberculin, the ' positive ' reactors, were also kept under observation. The total number of persons in this study is 21,000. Retests with tuberculin have shown that a high proportion of vaccinated persons still possess evidence of tuberculin ascribable to the BCG upto 11 years after the vaccination (51-53). Further, by noting the number of fresh cases of tuberculosis which developed in the three groups—the vaccinated, the unvaccinated controls and the initially ' tuberculin-positive ' group—from the time of their first tuberculin test till June 1963, there is evidence to suggest that within the period of observation the BCG vaccination has been able to induce so much protection that the attack rate from tuberculosis appears to have been reduced by about 60% (54). If this observation is substantiated by later observations, it will be of great importance. The present BCG Control Study is the only one in Asia and therefore of particular interest.

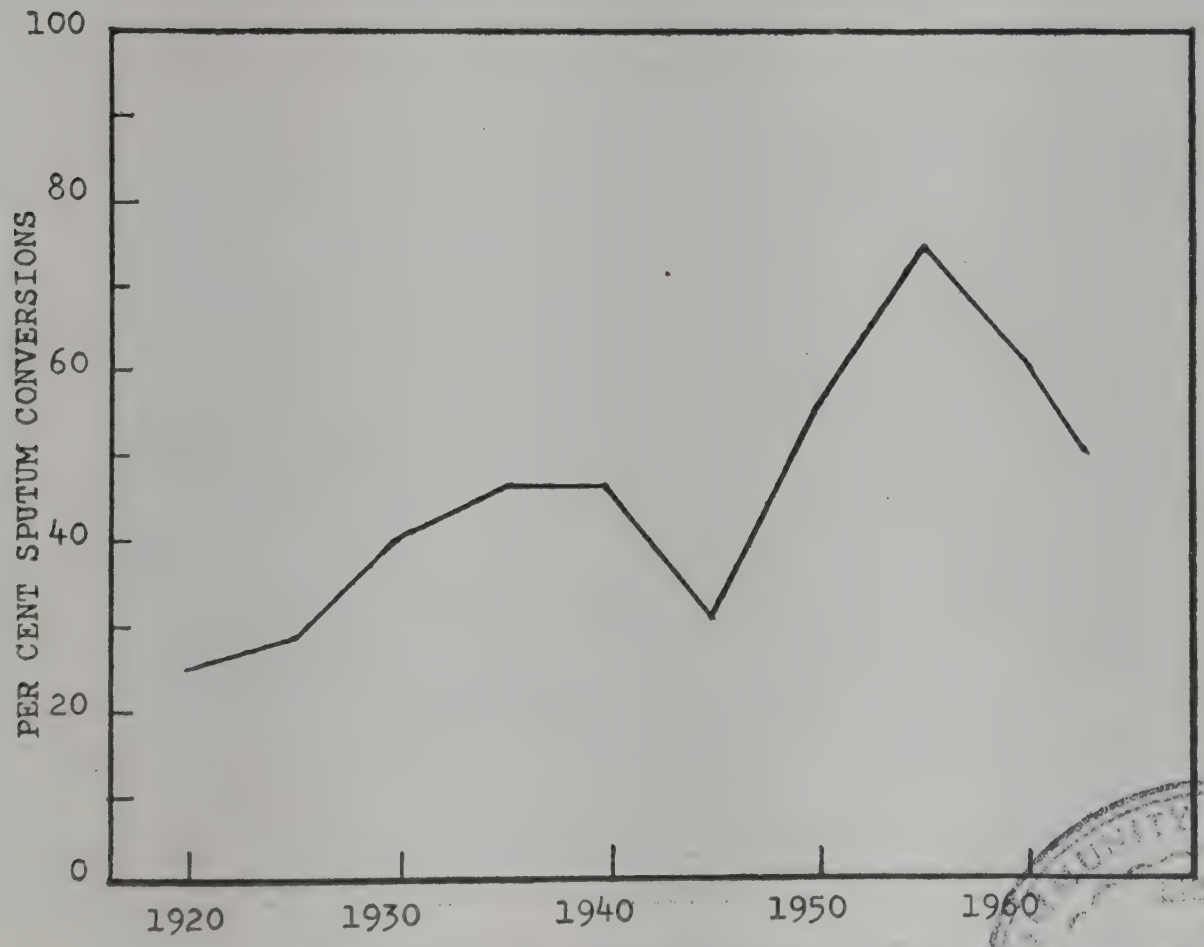
DRUG TREATMENT IN THE HOME AS TOOL OF TUBERCULOSIS CONTROL

The Tuberculosis Chemotherapy Centre, Madras, had shown in 1957 that tuberculous patients could be treated as successfully at home as patients in a tuberculosis hospital, provided they took their drugs regularly for at least a year. In order to find out whether it is possible to get ordinary people in an Indian Community suffering from tuberculosis, to take drugs by themselves while they go about with their normal duties, and in order to see if such measures can reduce the spread of the disease in the community by closing the sources of infection when patients get cured, the Sanatorium undertook on behalf of the Indian Council of Medical Research and the W.H.O. to examine these questions.

In 1959 a sample survey by X-ray was carried out in 12 towns lying in Chittoor, Cuddapah, Ananthapur, Kolar and Chingleput districts, and in 1960 six of the 12 towns were selected as ' treatment towns.' During 1960-64 intensive



CHANGES IN AGE OF PATIENTS

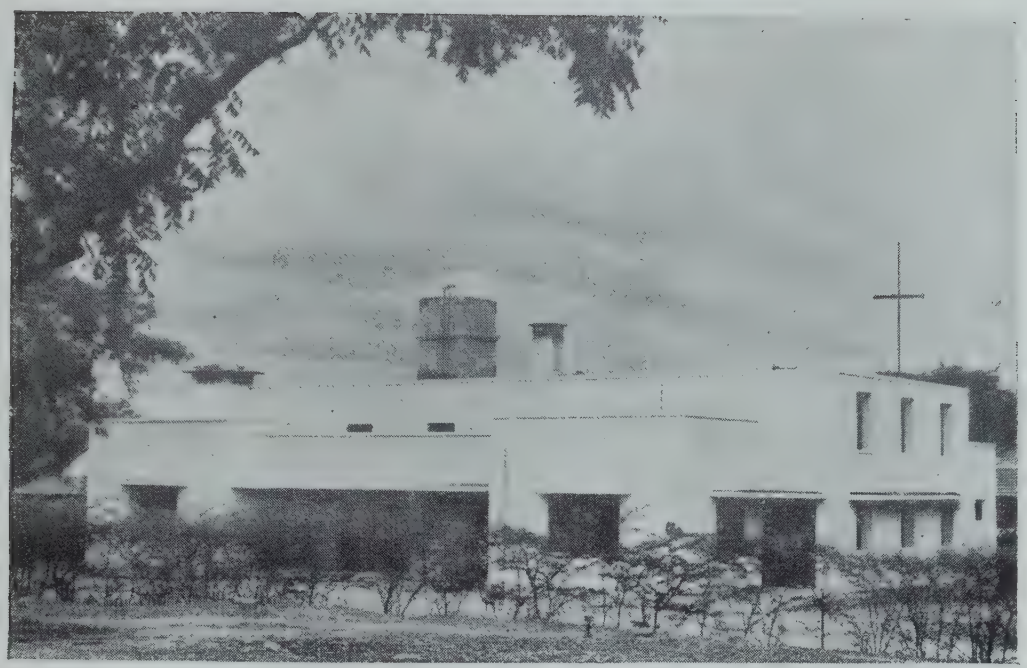


TREATMENT RESULTS BY BACTERIOLOGY

search for all existing patients in these towns with a total population of 85,000 were carried out by two complete X-ray Surveys. All patients found were offered treatment for 12 months by issuing drugs to them every fortnight. About 70% of the patients have co-operated well and taken their drugs regularly, and the results of the treatment are, therefore, also encouraging. About 50-60% of the patients who had tubercle bacilli in their sputum to begin with, showed disappearance of the bacilli because of the drugs (55, 56). The main difficulty encountered was a fairly high percentage of patients showing bacilli with drug resistance from the start, and also a number of patients who developed bacillary resistance during the treatment. How to overcome this difficulty is now under investigation. With a view to measure the total effect of the treatment with drugs at home in these 6 towns, the other 6 towns where no special measures were undertaken since 1959 will now be examined and the findings compared with those obtained in the 6 'treatment towns'. The results of this investigation may give very important information about how best to use the modern drugs to combat tuberculosis in the country.

NEW LIGHT ON THE INCIDENCE OF TUBERCULOSIS

Tuberculin tests have been, as already mentioned, used to find out how many in a population have been infected with tubercle bacilli. This presupposes that a reaction to the skin test with tuberculin is due to sensitivity caused by tubercle bacilli. That this is not necessarily so has been shown by Dr. C. E. Palmer and his co-workers. Some persons can be sensitized by other types of organisms than the tubercle bacillus, and this can give rise to a kind of 'false' tuberculin reactions. Until some years ago we thought that all persons in South India reacting to a tuberculin test had been infected with tubercle bacilli. We now know that such 'false' reactions are quite common here in S. India also, so the previous estimates of the incidence of persons infected with tubercle bacilli have had to be revised. They have been too high. Recent investigations by the Sanatorium indicate that there may be even less infection with tubercle bacilli than we expected, so that in the village population around Madanapalle only a fairly small minority possesses the genuine type of tuberculin sensitivity while the great majority have been infected with the other kind of organisms which produce 'false' reactions. These findings are so important for our whole understanding of the epidemiology of tuberculosis and for planning an attack on the disease, so that a special investigation has been set up in co-operation with Dr. Palmer's office in the U.S. Public Health Service, Washington, and supported by the P.L. 480 Funds. It is hoped that it should be possible to isolate and identify the organisms which are responsible for this widespread 'false' tuberculin sensitivity and thereafter to produce new and better kinds of tuberculin which can be used together with the genuine tuberculin, to distinguish between 'false' and 'genuine' skin sensitivity.



General Diet Kitchen

Serving out Food to General Wards

Towards North-East, Growling Peak in the Background

Towards South-West, Doctors' Delight in the Background

CONCLUSION

During the 50 years of existence of the Sanatorium a great deal has been learned about tuberculosis. Even 25 years ago we dared not dream that we should have so much new information about the behaviour of tuberculosis in India as we have today, neither could we know that we should have in our possession such highly potent new drugs which makes it physically and economically possible to fight tuberculosis effectively in every nook and corner of this vast land. The situation today is so enormously altered as compared with that of 50 years ago, that it can hardly be realised by young tuberculosis workers who have had their training since the war. Yet tuberculosis continues to be the most intriguing disease man has had to deal with. It knows how to elude us—as e.g. by the development of drug resistance just when we thought we could wipe it out with the new drugs. The new discovery that there are other organisms competing with tubercle bacili, or at least posing as such, although they may not be harmful in themselves, shows that we can never be sure that we have learned everything about tuberculosis.

So the search must go on—but we can be sure of one thing : we are much closer now to the victory over the disease than we were 50 years ago and could imagine even a few years ago. But—to close with a biblical expression—' the harvest is plenteous but the labourers are few.' Many more young tuberculosis workers are needed.

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TUBERCULOSIS—CHANGES IN THE CLINICAL SET-UP

DR. K. T. JESUDIAN

'Old order changeth, yielding place to new and God fulfills Himself in many ways lest one good custom should corrupt the world.'

This quotation is as much true to life as to the fight against tuberculosis. The old conception of tuberculosis and old methods of treatment have, during the last 50 years, undergone radical changes. What one swore by or acclaimed as first things first in the war against tuberculosis, has almost been forgotten or is looked upon as mere relics of the past.

The U.M.T. Sanatorium has from its inception, kept in touch with the methods and techniques of treatment of tuberculosis in the West and has adopted all scientific methods of investigation, care and after-care of patients.

The changes in the clinical set-up during the last 50 years can be considered under 5 main heads :

(1) General management including outlook.
(2) Medical treatment.
(3) Surgical measures.
(4) Children's section.
(5) Clinical Research with laboratory assistance.

General Management—Sanatorium treatment.

The Sanatorium treatment consisted of accommodation in open wards, situated away from towns and cities, combined with nourishing food and graded exercise. There were no antituberculosis drugs. The following extract from an earlier report from this institution emphasises the efficacy of the Sanatorium treatment :

> 'The mistaken conception that Sanatorium management consisted merely of an open-air treatment led people to think that if open-air conditions are created in a private house, a patient can gain as much benefit from treatment there as in a Sanatorium. That this was not so was proved not only by the convincing research work but also by the fact that the Sanatorium movement was constantly increasing all

* The object of this paper is to enlighten the lay public about the trend in the bed-side care of the tuberculous patient during the last 50 years with special reference to the service rendered by the Union Mission Tuberculosis Sanatorium, Arogyavaram.

over the world. The secret of the Sanatorium treatment was the constant daily changes of rest and graded exercise just in right proportion in each individual case. The exercise sets free from tubercular foci a certain amount of toxins which call into action defensive forces of the body by creating a sufficient amount of enzyme and antibodies to eliminate the tubercle bacilli from the body or to make them harmless by walling them in by the production of fibrosis.'

Life in a Sanatorium ensured isolation from the day to day worries of the patient in his home in addition to providing healthy surroundings and a pure atmosphere to live in.

With the evolution of specific medical treatment and other ancillary medico-surgical measures, especially in the past two decades, the Sanatorium regime has lost much of its importance and there are people who even advocate that new sanatoria are not needed.

The social stigma attached to tuberculosis in the old days was such that there was a tendency to hide the whereabouts of the patients and the nature of his ailment, resulting in grave consequences to the patient. With the advent of the new anti-tuberculosis drugs, this attitude on the part of the patient and his relatives, is beginning to disappear. The attitude of the patient is not a handicap any more in the treatment of the modern patient as he is willing to come forward and offer full co-operation for the treatment of his condition. He is beginning to realise that tuberculosis is not the dreaded disease that it used to be and that the future holds brighter prospects for him now than his counterpart, say 20 years ago. The tuberculosis consciousness is very much in evidence in the present-day, favouring proper diagnosis and early treatment. This is a forward step in the welfare of the community. It is heartening to see patients after recovery, marrying and living a normal life and raising healthy families.

The majority of patients in the Sanatorium at any given time in the present day, do not require close nursing care and therefore the nursing personnel are being given opportunities and time to do specialised work in the clinical set-up. On the other hand, maintaining strict discipline among patients who recover with the present regime too rapidly, poses constant administrative problems.

Medical treatment

Use of allopathic drugs in the form of powder and mixture has been by far the only medical treatment undertaken, chiefly with the object of controlling or alleviating distressing symptoms such as fever, cough, pain, sleeplessness etc. In the absence of specific drugs which would act directly on the tubercle bacilli or its products in the body, treatment with vaccines gained popularity in selected cases. The vaccines used were Tuberculin (Koch's bacillary emulsion) and Dreyer's vaccine. Given in afebrile cases, in proper doses and intervals,

greater resistance in the system is produced by increasing antibodies in the blood. In the long run, the progress of the lesion is retarded and healing by fibrosis of the diseased spots is encouraged.

Sanocrysin

In the early twenties, gold therapy was introduced in the treatment of tuberculosis, in this institution. That gold had a specific action on the tubercular lesions was claimed by Prof. Mollgaard of Denmark. The preparation was known as 'Sanacrysin'. There are on record a large number of patients with fairly early and active disease who have responded to this form of therapy. However, this treatment was frought with the danger of damage to the kidneys, showing albumin in urine. In some cases it produced a skin rash. Although this treatment was claimed to be one of the greatest discoveries of the time in the field of tuberculosis, the use of this drug came to an almost abrupt end.

Antitubercular drugs

As a result of extensive research, the 'wonder drug' *Streptomycin* was discovered in the early forties, and the drug was introduced in this institution a few years later. The drug was administered in high doses without any companion drugs. Good results were obtained. But almost in the wake of the discovery came the red signal against indiscriminate use of this drug singly. The efficacy of this drug was soon lost as resistant strains of bacilli developed. The discovery of *PAS* followed in quick succession by *Isoniazid* provided the answer for the problem of resistance to the drug. It is now known that these three standard drugs should be given together or in certain combination.

Patients developing resistance even with the combined use of the above three drugs can now be helped with the latest 'Salvage' drugs known under the trade names of *Pyrazinamide, Cycloserine, Ethionamide, Viomcyin* and *Thiacetazone* etc. Trials and treatment have already been undertaken with these drugs. Cycloserine is highly potent in combination with PAS if the bacilli is resistant to Streptomycin, and INAH but sensitive to PAS.

Surgical care

The introduction of surgical methods in the care of tuberculosis enabled Sanatorium to accept for treatment moderately advanced cases. Artificial pneumothorax marked the beginning of surgical methods in the treatment of tuberculosis. This method consisted in the collapsing of the diseased lung by the introduction of air into the pleural cavity. There is no doubt that this form of treatment has produced favourable results, but the complications of this form of treatment such as formation of fluid in the pleural cavity, spread of disease on the same side as well as on the contralateral side discouraged the continuance of this method. In the meanwhile other forms of collapse therapy such as thoracoplasty operation were introduced with encouraging results and treatment by Artificial Pneumothorax was continued only in a limited way.

When the new drugs were introduced, the indications for A.P. treatment became less and less and eventually this method became obsolete.

Phrenic nerve operation—A number of patients received treatment with a small operation by which the nerve supply to the diaphragm was either temporarily or permanently interrupted, producing favourable results in lesions situated close to the diaphragm. But in the late forties this form of treatment also became obsolete.

Another form of collapse therapy known as *Extrapleural Artificial Pneumothorax* was tried and given up.

Thoracoplasty operation—This operation was also designed with the object of relaxation and compression of the diseased lung or portion of the lung. The original form of this procedure was to resect small segments of ribs overlying the diseased part in one sitting. This operation was later modified for two reasons : (1) inadequate collapse ; (2) risk of spread of disease due to too much collapse in one sitting. The modified operation is the modern thoracoplasty performed in small stages and effecting a selective collapse. The advent of specific antibiotics opened the way for the admission and treatment of advanced cases of pulmonary tuberculosis. With sufficient drug treatment, a large number of patients received lasting results. This therefore brought in a revolutionary change in the trend of surgery. Therefore, surgery was indicated in such of those cases who were either left with residual disease with cavity and positive sputum or residual disease with a resistant strain of bacilli. These cases were best handled by either thoracoplasty of resection.

Lung Resection—Resectional surgery in the treatment of pulmonary tuberculosis has assumed a definite place in the handling of tuberculous cases. This surgery is a major procedure undertaken with specialised anaesthesia. This operation involves removal of diseased lung or part, in a variety of ways depending on the extent and distribution of the disease. The main aim in this is to remove the areas of disease considered dangerous and not to interfere with healing spots that are not likely to cause trouble in future. So the excision may take the form of pneumonectomy (whole lung), lobectomy, segmentectomy or even smaller portions called wedge resections.

After prolonged drug treatment the diseased processes are stabilized and made suitable for this procedure. At the present time the majority of cases undergoing this treatment are cases with unilateral extensive disease requiring whole lung removal. Smaller resections like lobes, segments, etc. are by far few. It is hoped that in some later years with adequate countrywide control of the disease the types of cases requiring surgery may have only minimal lesions and that the surgery also will not be so drastic as now. At present since most cases are cases with resistant strain of bacilli it is advisable and safer to undertake this form of surgery when the bacilli are still sensitive to at least one of the standard drugs. Long-term post-operative chemotherapy is a most important part of general treatment.

Children's Section

The establishment in 1955 of a section for children suffering from tuberculosis is a milestone in the clinical set-up of this institution. It has answered a long felt need. This section is now the most delightful spot from the point of view of its buildings, the service facilities and above all of the cheerful atmosphere prevailing there.

Children admitted and treated in this section conform to four main forms of manifestation of tuberculosis. They are :—

1. *The typical primary infection*

The children in the ' Babies' Section ' fall into this category. Here the manifestation of the disease is detected in chest X-ray as a fresh localised lesion in the lung produced as a result of entry of bacilli in that part of the lung. It has also a glandular component which shows as an abnormal round shadow near the hilum (root of the lung). Most of the cases admitted with this disease give a history of contact. A large number of admissions in recent times into this section are contact children of patients who are known to us either as out-patient consultations or as in-patients with open tuberculosis admitted into the main Sanatorium. Among these children, except for the very sick ones, who require quick treatment with anti-tuberculosis drugs, the others usually have a good chance of recovery provided a good regime of conservative treatment consisting of strict rest in bed and nourishing diet can be ensured.

2. *Post-primary disease*

This form of disease is caused by uncontrolled and active spread beyond the normal components of the primary complex described above. The spread is seen in one of three ways. If the spread takes place into further lung field, it is seen either as a big pneumonia or as a breaking down cavity. If the spread involves a blood vessel and breaks into it, it causes circulation of large number of bacilli in the blood stream resulting in manifestations like miliary tuberculosis or meningitis, or both. Post-primary lesion in the spine and in the abdomen have also been seen occasionally. Lastly the fast spread of the primary lesion can take place along the lymphatics, resulting in massive enlargement of the chain of glands inside the thorax and also outside.

3. *Open pulmonary tuberculosis*

This is another form of tuberculosis seen in children similar to the type commonly seen in adults. This is produced either by active spread of the primary infection which has a doubtful result or as a result of super added infection from the same contact source. Response to treatment depends upon the extent and nature of the disease and the susceptibility of the bacilli to drugs. However, a few cases have been seen infected with resistant strain of bacilli who have a poor chance of recovery. Lung resections have given very encouraging results in this group.

4. *Non-respiratory tuberculosis*

This form of manifestation has been mostly seen as diseases of bones and joints and a few cases of disease of lymph glands especially neck. With modern methods of immobilization along with prolonged administration of anti-tuberculosis drugs, these children have shown consistent clinical as well as radiological improvement. Periodical consultations with orthopaedic specialists from the Christian Medical College and Hospital, Vellore have greatly assisted us in this work. Orthopaedic surgery in suitable cases is undertaken with the object of either fixing diseased part of the spine or relieving pressure on the nerves caused by accumulation of tuberculous pus and dead matter. Corrections of deformity due to joint involvements as in hip disease are also undertaken.

Besides the above service in the Children's Section, a large number of children with non-tuberculous infection of lung are admitted for the sake of surgery in most cases. These are cases of bronchiectasis, congenital cystic disease, lung abscess and hydatid cyst. Laboratory information of culture of sputum for all known organisms and their sensitivity to antibiotics is essential and is an asset.

Clinical Research with Laboratory Assistance

Of all methods of investigations helpful in diagnosis and treatment, and in the assessment of the value of a treatment, bacteriological study has in recent times assumed a very important place. Rightly so, emphasis on the laboratory investigation and control of individual case of pulmonary tuberculosis has become increasingly bacteriological. The cultural isolation of the bacilli and the determination of their drug susceptibilities are of paramount importance in the treatment. Sensitivity tests to the standard drugs are now a routine procedure. With the increase in disease due to infection by bacilli resistant to the standards drugs, it is necessary for the laboratory to be able to determine bacteriological sensitivity to the second line of drugs as well.

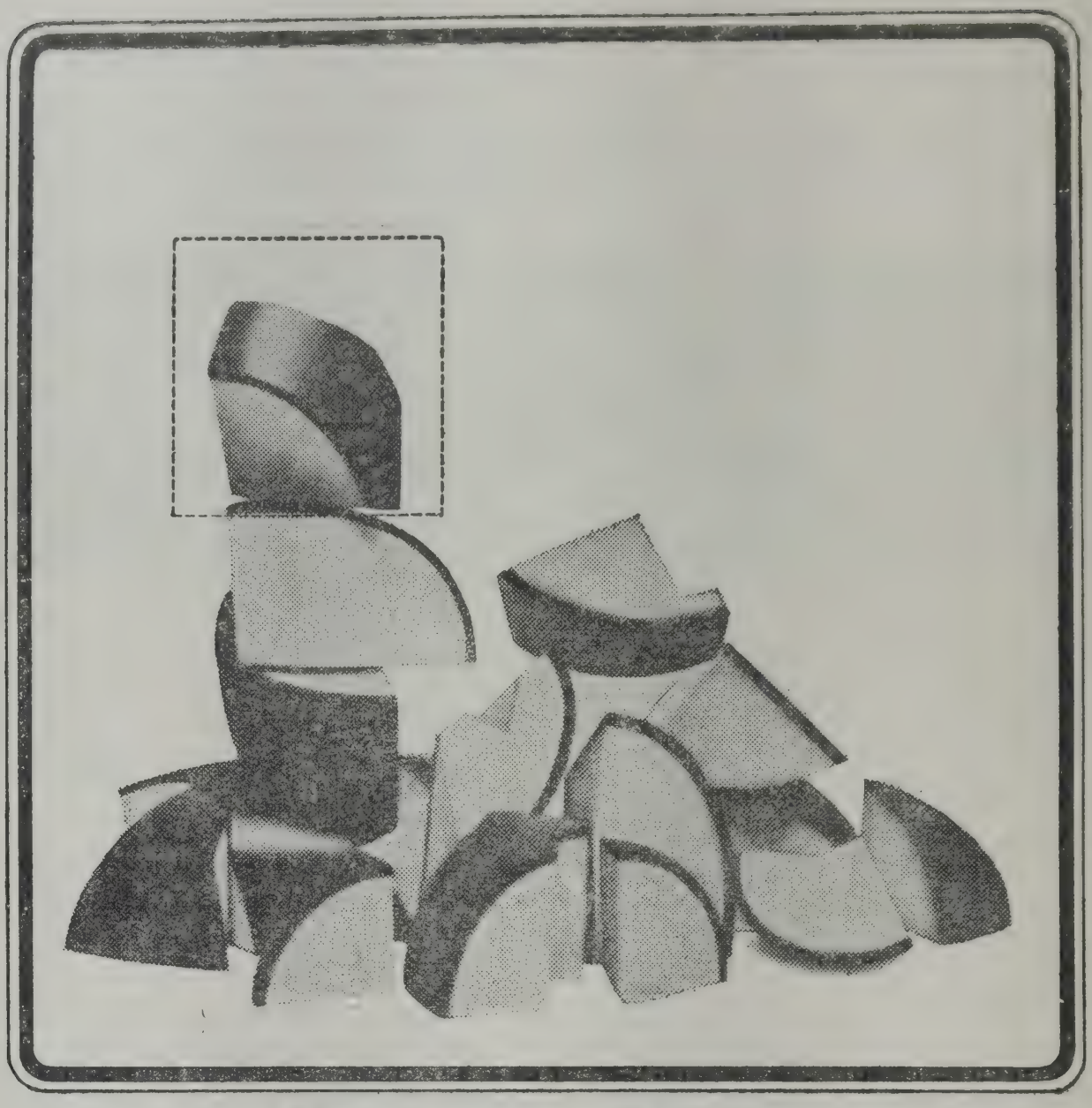
With such a vital link in clinical set-up, the medical as well as surgical handling of patients has become more scientific and reassuring.

Conclusion

A patient on arrival is received with courtesy and kindness by the nursing staff and the initial needs of rest in bed, food and attention to any distressing symptoms are looked into. This is followed by scientific investigations and examinations. The integrated units of laboratory, X-ray and clinical examinations by trained medical personnel working in close conjunction with each other, give the patient a sense of security. In due course the patient receives a full report of his condition and the treatment that is to follow. Nursing care, timely food, regular and systematic administration of drugs, personal talk and advice regarding rest and exercise and the general atmosphere of sympathy and concern for his welfare, go a long way to win over the patient's full co-operation.

Financial implications are explained in full and wherever possible assistance is given in this direction. Special investigations in the X-ray and Laboratory such as tomography, bronchography, culture of gastric lavage, laryngeal swab and sub-cultures for sensitivity study etc. are completed as early as possible. Medical treatment with antitubercular drugs is instituted according to individual indication, guided and controlled from time to time by special reports from the laboratory. In resistant cases, auxiliary drugs are prescribed and made available.

Surgical treatment is carefully planned out and in consultation with the patient and his people, operations are undertaken. Surgical work is done under perfect conditions. Due care and attention are paid to pre-operative medical regime and physiotherapy. Specialized post-operative nursing and physiotherapy are routine features, enabling an uneventful recovery. An attitude of love and sympathy on the part of the medical, nursing and other staff is found to be of great value in the progress of the patient. Commudication with the patients during rounds and helpful talk at interviews by senior doctors generate in the petient a spirit of co-operation and confidence.



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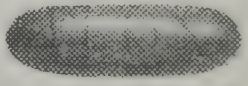

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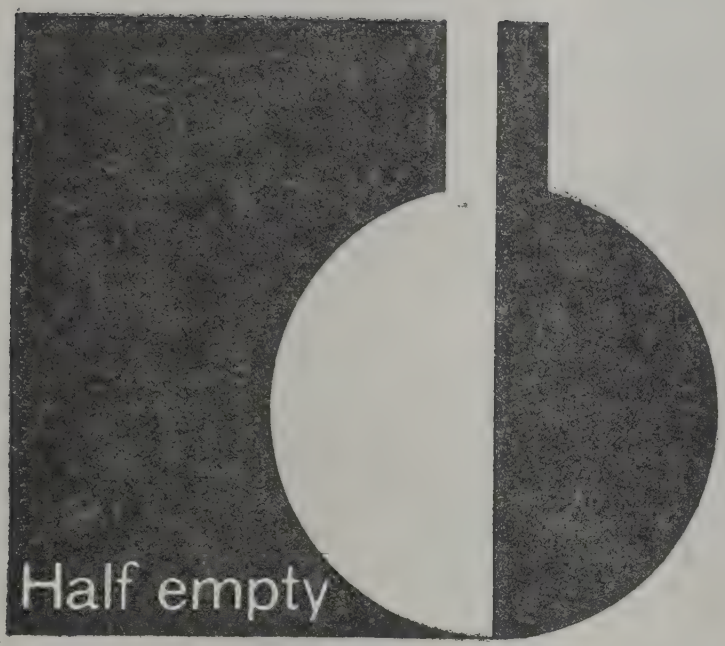

or half full?

There's an old saying that goes, 'A pessimist calls half empty what an optimist calls half full.' Which are you, a pessimist or an optimist? If you were closely associated with research, you might be a little of both. You would be sceptical about tests that didn't stand up to a severe critical examination; cautious of information that was inconclusive and vague. But you would be optimistic, too. You'd persevere despite initial disappointments and failures because you'd feel certain of ultimate success. □ Now with the completion of the CIBA Research Centre at Bombay, there will be exciting developments that will have a far-reaching influence on our lives. In its 80 modern laboratories, chemical and biological research will be conducted on a scale never before attempted in the country.

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